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A COMPARATIVE STUDY OF THE SYNTAX IN SPEECH AND WRITING OF GRADE ONE STUDENTS USING THE INITIAL TEACHING ALPHABET AND STUDENTS USING TRADITIONAL ORTHOGRAPHY. FINAL REPORT.

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DESCRIPTORS- *INITIAL TEACHING ALPHABET, *LANGUAGE ARTS, *ORAL COMMUNICATION, *SYNTAX, *WRITING SKILLS, ORTHOGRAPHIC SYMBOLS, ALPHABETS, COMPARATIVE ANALYSIS, CONVENTIONAL INSTRUCTION, ELEMENTARY EDUCATION, GRADE 1, SPEECH, TRANSFORMATION THEORY (LANGUAGE), WRITING, ENGLISH INSTRUCTION, LANGUAGE RESEARCH,

THE PURPOSE OF THIS STUDY WAS TO COMPARE SENTENCE-COMBINING TECHNIQUES OF PUPILS USING THE INITIAL TEACHING ALPHABET (I.T.A.) WITH THE TECHNIQUES OF PUPILS USING TRADITIONAL ORTHOGRAPHY (T.O.). THE INVESTIGATION CONSIDERED--(1) WHETHER I.T.A. PROVIDES A LINGUISTIC ADVANTAGE IN THE WAY PUPILS ADD GRAMMATICALLY TO THEIR SENTENCES, (2) WHETHER THERE IS EVIDENCE TO SUPPORT HOW THE BASIC TEXTS READ BY PUPILS MAY INFLUENCE THEIR CORRECT USE OF GRAMMATICAL STRUCTURES, (3) WHAT THE DIFFERENCES BETWEEN ORAL AND WRITTEN RESPONSES SUGGEST ABOUT PUPILS' ACQUISITION OF SYNTACTIC CONTROL, AND (4) WHETHER BOYS' AND GIRLS' RESPONSES DIFFER SIGNIFICANTLY. ONE HUNDRED AND THIRTY-SIX FIRST-GRADE, WHITE STUDENTS OF ABOVE-AVERAGE INTELLIGENCE, ACHIEVEMENT, AND SOCIOECONOMIC STATUS WERE SUBJECTS IN THE STUDY. APPROXIMATELY 300 WORDS WERE COLLECTED FROM THE WRITING OF EACH PUPIL, AND AN APPROXIMATELY EQUAL NUMBER OF WORDS WAS COLLECTED FROM THE ORAL RESPONSES OF 60 RANDOMLY-SELECTED STUDENTS AMONG THESE SUBJECTS. TRANSFORMATIONAL ANALYSIS OF THE ORAL RESPONSES INDICATED NO SIGNIFICANT VARIATION BETWEEN THE I.T.A. AND T.O. GROUPS IN THE USE OF SENTENCE-COMBINING TRANSFORMATIONS. HOWEVER, ANALYSIS OF THE I.T.A. GROUP'S WRITTEN RESPONSES REVEALED ADVANTAGES IN SENTENCE COMBINING--(1) FEWER SENTENCES CONJOINED AND "AND," (2) SLIGHTLY MORE EMBEDDINGS OF TRANSFORMS WITH DELETIONS, AND (3) SIGNIFICANTLY FEWER FAILURES PER 100 SENTENCE-COMBINING TRANSFORMATIONS. THE GREATER GRAMMATICAL DENSITY OF CLAUSES IN THE TEXTS USED BY THE I.T.A. GROUP PROBABLY AIDED BY PUPILS IN ACQUIRING THE LATTER TWO ADVANTAGES. MODIFIERS, PREDICATES, T-UNITS CONNECTED BY "AND," GENITIVES AND COORDINATES OF NOUNS WERE USED MOST FREQUENTLY IN BOTH THE SPEECH AND WRITING RESPONSES OF BOTH GROUPS, INDICATING EARLY ACQUISITION AND MASTERY OF THESE FORMS. NO SIGNIFICANT DIFFERENCES IN SENTENCE-COMBINING TECHNIQUES WERE FOUND BETWEEN THE BOYS' AND THE GIRLS' RESPONSES. (RD)

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A COMPARATIVE STUDY OF THE SYNTAX IN SPEECH AND WRITING OF GRADE ONE STUDENTS USING THE INITIAL TEACHING ALPHABET AND STUDENTS USING TRADITIONAL ORTHOGRAPHY

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West Lafayette, Indiana

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SUMMARY

The purpose of this study was to examine sentence combining techniques of two groups of first grade pupils. The major differences between the two groups were three: alphabet, proportionate emphasis given to writing and speaking, and instructional materials. One group (I.T.A.) used the Initial Teaching Alphabet, an interim alphabet of forty-four graphic symbols. The alphabet is basically phonemic. The other group (T.O.) used the conventional alphabet consisting of twenty-six letters.

The subjects of this study were 136 white, first grade pupils who were above average in intelligence, achievement, and socio-economic status. All attended the West Lafayette Schools. The groups were not significantly different in age, socio-economic status, or readiness. An analysis of covariance, with IQ as a covariate, was used to control for the slight IQ differences between the two groups.

Approximately 300 words in writing were collected from each pupil. In addition, approximately the same number of words per pupil was collected for sixty subjects who were randomly selected to give oral responses.

A transformational analysis of the oral responses indicated that the two groups of pupils did not vary significantly in the use of sentence combining transformations. It could be assumed that both groups of pupils in this study were equipped with essentially the same intuitive knowledge about sentence combining techniques in speaking. However, the findings from the analyses of the written responses indicated that the I.T.A. medium allowed the pupils to have several distinct advantages in sentence combining. In the written responses, the I.T.A. pupils (1) chose to conjoin fewer sentences with "and" (2) embedded slightly more transforms with deletions, and (3) had significantly fewer sentence combining failures for each 100 sentence combining transformations. It can be assumed that the graphemic and syntactic constraints influenced by the I.T.A. medium permit the pupils to avoid sentence combining failures and to incorporate more sophisticated sentence combining techniques than those attributed to the T.O. group.

The conclusions should not imply that the conditioning under these constraints will indelibly mark the post-I.T.A. pupils as "linguistically advantaged." The influence of other stimuli will determine whether or not the post-I.T.A. pupils loose or gain ground. It is hoped that this investigation may in some small way contribute to any educational pursuits for developing new stimuli that will condition any post-first grade pupil to feel at ease with the graphemic and syntactic constraints in writing.

GENERAL INTRODUCTION

This study is addressed to educational service personnel interested in examining mediums of instruction designed to teach more effectively the skills of reading and writing. The medium, in this case, is the I.T.A. reading and writing program that involves the use of an interim alphabet consisting of forty-four graphic symbols to represent forty sounds in English. The purpose of this study is to compare sentence combining techniques of pupils using I.T.A. with those of pupils using traditional orthography, from this point to be referred to as T.O. The analysis of syntax is based on a model of transformational grammar, and the design of the criteria for linguistic maturity is attributed to the findings in the normative studies on syntax made by Hunt (1965) and the team of O'Donnell, Griffin, and Norris (1967).

This investigation attempts to answer four major questions:

1. Does the I.T.A. medium provide a linguistic advantage in the way that pupils' grammatically add to their sentences?
2. Is there any evidence to support how the basic texts read by either group may influence the pupils' correct use of grammatical structures?
3. What do the differences between the written and oral responses suggest about pupils' aquisition of syntactic control?
4. Do the boys' responses differ significantly from the girls' responses?

Three important features distinguish this study from previous research with first grade pupils: (1) This study brings together two new avenues in educational research: the influence of the Initial Teaching Alphabet as an interim alphabet and the study of syntax in first graders' written and oral responses. (2) A model of transformational grammar is used in this analysis. (3) Approximately 300 words per pupil were used in examining both written and oral responses.

The following limitations are important for the reader to keep in mind as he examines the contents of this investigation:

1. This study is based on responses from pupils in American I.T.A. programs, which differ considerably from the British I.T.A. programs. Thus, the reader should be cautioned in applying the findings of this study to the I.T.A. programs in British schools.

2. The pupils in both groups (I.T.A. and T.O.) are above average in intelligence, achievement, and socio-economic status; and, consequently, responses from these subjects should not be construed as responses from a normal population.

3. In addition to using individualized reading materials, the pupils enrolled in the traditional first grade programs used Ginn basic readers as the core of first grade reading materials. Pupils using other texts might have responded more favorably or less favorably.

4. This study is an analysis of one aspect of writing and speaking: the control of grammatical structures in sentence combining operations. Such concerns as spelling, vocabulary, punctuation, capitalization, paragraph development, and creativity are not investigated here.

Because of some misconceptions of the theory of transformational grammar, it is also important to add a note of caution in order to avoid any ambiguity that this analysis of syntax is in any way attempting to describe the neurophysiological process which allows the child to produce a sentence. Transformational grammar is merely a device for describing a notion of the correctly constructed utterances of the language. The aim of the method of its description is to give a model of the intuitive knowledge which the users of the language must know in order to put together a correct English sentence. Descriptions of grammatical structures in the operational terms of a transformational grammar are used in this study because they best serve the purposes. Zellig Harris (1965) sums up the value of a transformational analysis in these terms: "...it can be described and investigated with algebraic tools...it provides exceptionally subtle analyses and distinctions for sentences." (p. 368)

CHAPTER 1

RESEARCH IN I.T.A.

Claims about I.T.A. Performance

I.T.A. Writing "Far Superior": Since I.T.A. was introduced to the American schools in 1963, many reports by I.T.A. consultants have claimed "better writing" on the part of I.T.A. pupils. Reports about the superiority of I.T.A. writing, such as the one that Alpert (1965) made at the Second Annual International Conference on the Initial Teaching Alphabet, have been repeated frequently in news items about the world of I.T.A.:

> "Almost everyone who has worked in an I.T.A. program has been enormously impressed with the quality of the students' creative writing... He almost without doubt, would agree that the creative writing of children instructed with I.T.A. is far superior." (p. 297)

And in a more recent report, Dr. Albert Mazurkiewicz (1967b) has stated that the results of the four year study in the Bethlehem Area School District show that the achievements in creative writing by the I.T.A. taught children were significantly better than the achievements of the T.O. taught children. Unfortunately, many of the reports, whether they are conclusions drawn from formal approaches in research or whether they are merely subjective observations being passed on, sound like unwarranted boasts, since little evidence is given to prove the claims.

Chasnoff's Study: The only research in I.T.A. which comes close to evaluating first graders' skill in composing sentences is a study made by Robert Chasnoff (1967b), who compared the "meaningfulness of communication" found in the writings of I.T.A. and T.O. pupils. However, some serious questions may be raised about Chasnoff's methods of sampling, measuring, and ranking. From seven T.O. classes and seven I.T.A. classes, he collected two written samples; both were typed on one 4 X 6 inch card for analysis. Four judges then examined each card and ranked the responses on a five point scale, with the score of five being the highest. The judges were given a ten point criteria upon which to base their scoring:

1. meaningfulness of communication
2. over-all length
3. length of sentences

4. use of elaborated sentences
5. complexity of words used
6. imagination and orginality of "flavor"
7. use of adjectives and adverbs
8. use of subordinate clauses
9. variety of words used
10. evidence of complete thought

The judges were cautioned not to try finding evidence for all the criteria for each sample. "Emphasis was to be placed on a quick impression, with the criteria in mind." In other words, the criteria were mythical. And even if the criteria were not mythical, there would be good reason to question (1) why such items as "over-all length" and "sentence length" should be listed as criteria for measuring meaningfulness in communication, and (2) whether the length of the writing samples from each pupil was an adequate representation of the pupil's writing ability. If anything, such an analysis should measure the reliability of four judges' subjective responses with the use of vague criteria for evaluating an inadequate sampling of pupils' written responses. Chasnoff reported that the writings of the I.T.A. pupils received a mean score of 3.00, while that of the T.O. pupils received a mean score of 2.58.

Mazurkiewicz's Findings: By writing "better" other I.T.A. researchers have meant that I.T.A. pupils write "more" running words or that they write "more" polysyllabic words than the T.O. pupils. The constraints of such findings were well phrased in Mazurkiewicz's Final Report on The Initial Teaching Alphabet in Reading Instruction (1967a):

> Significant accomplishments are found in these children's creative writing in terms of the number of running words and the number of polysyllabic words used. (p. 72)

However, in an i.t.a. - Language Arts Project Final Report (1967b) that followed, Mazurkiewicz summarizes his previous findings about writing by stating that the achievement in "...creative writing is significantly better than the achievement of the T.O. taught children." (p. 2) This summary is extremely misleading. First, serious doubt is raised by Mazurkiewicz's assumption that "total running words" and "total number of polysyllabic words are sensitive indices for determining better use of the language in writing. A study of the Syntax of Kindergarten and Elementary School Children by O'Donnel, Griffin and Norris (1967) justified the reluctance to regard a gross word count very seriously as a measure of language mastery in school age children. Furthermore, a battery of questions might be raised about the aims of Mazurkiewicz's study in order to better evaluate the statement of his findings.

> Are the findings to suggest that I.T.A. pupils are more skilled in developing topics? If so, what topics were used in his experiment? (No description of writing procedures were given.) And if topic development were the aim, might there have been a more appropriate index used to measure depth levels of development?
>
> Or do Mazurkiewicz's findings suggest that use of the I.T.A. alphabet gives pupils better control of the language in writing sentences? If this is the case, what determined that the I.T.A. pupils did write better sentences in first grade? Certainly not total words.

In the i.t.a. - Language Arts Project Final Report, Mazurkiewicz did include some tabulations of second, third, and fourth graders' mean length of T-units, Kellogg Hunt's index for linguistic maturity. (This index will be explained in much detail later in this chapter.) However, Mazurkiewicz's failure to include any description of procedures for scoring T-units and administering the writing assignments, and his arithmatical error in one table, where average clause length of an I.T.A. group was longer than the group's mean T-unit length, makes the findings almost impossible to interpret. (See Appendix A for tables of Mazurkiewicz's findings.)

Asher's Reviews of I.T.A. Research

Further evidence of unreliable reporting in Mazurkiewicz's studies is given in two articles by Asher (1968a: at press for spring publication in Elementary English) (1968b: unpublished). Asher found Mazurkiewicz's research on spelling (1968a) and reading achievement (1968b) to contain serious errors in experimental design and statistical tests, and inadequate descriptions of populations, sampling techniques, and procedures that define the i.t.a. and T.O. methods.

Conclusion about I.T.A. Research in Writing

There may be good reason to believe that the I.T.A. medium has been of significant value in eliminating some of the frustrations that students encounter in getting the printed word down on the page, but there is no conclusive evidence to support the I.T.A. claims that pupils enrolled in their programs write with more skill in developing topics or composing sentences--which most people call writing.

Research about I.T.A. writing performances has thus far failed to incorporate: (1) an adequate sample of writing from each pupil (2) a valid index for comparing both I.T.A. and T.O. responses (3) an analysis of a specific area related to the way the pupil adds to his composition--since composition is essentially addition or development (4) a careful description of procedures for administering assignments and analyzing responses.

RESEARCH RELATED TO SYNTACTIC CONTROL IN WRITING AND SPEAKING

The Young Pupil's Grammatical Span

Forming Sentences: By the age of six, the normal child has much intuitive knowledge about the internal organization of sentence parts and relations among these parts. His ability to speak well-formed sentences effortlessly makes him, in Hockett's (1958) terms, "a Linguistic adult." However, the six-year-old's skill in handling a core of information about forming correct sentences in English does not mean that he will control grammatical structures the way an adult might. Occasionally he may get grammatically tangled in trying to produce long utterances involving more modifiers than he is accustomed to using. His span of information about ways to grammatically add to his sentences is relatively narrow.

Combining Sentences: As the child gets older, he discovers ways of expanding his main clauses; that is, he learns how to reduce and embed some of the utterances he normally produces as sentences. For the most part, this acquisition of ways to grammatically add to his main clauses is slow. Starting early in the school years, he frequently tries adding by linking together main clauses with conjunctions. In Hunt's (1965) analysis of structures used by pupils on three grade levels: 4 - 8 - 12, the younger pupils used coordinators with far greater frequency than did the older pupils. Hunt also reported that the younger pupils had fewer grammatical structures embedded in main clauses, the implication being that as pupils increase in age, they learn how to reduce what they normally write as sentences to phrases, single words, and subordinate clauses attached to the main clause. In transformational terms, the younger pupils embedded fewer sentence transforms than did the older pupils.

The following table from Hunt's findings is based on the expanded nominal structures that were most indicative of continuous growth; namely, noun clauses, gerunds, and adjectives, prepositional phrases, infinitive phrases, participial phrases, and relative clauses that modify nouns.

TABLE 1

SENTENCE COMBINING TECHNIQUES IN GRADES 4-8-12

Pupils	Grade Level	Main Clauses Coordinated with And	Sentence Transforms in Nominal Slots
18	4	574	1168
18	8	284	1790
18	12	172	2209

Hunt's study was based on a sample of 1,000 words from each pupil.

Differences in Syntactic Control: From Hunt's study, it can be inferred that a very young writer will tend to produce main clauses without many modifiers attached:

The gorilla was friendly/ He carried the suitcases/
They were filled with gold/ and they were heavy/

On the other hand, an older writer will tend to produce main clauses with significantly more modifiers attached:

The friendly gorilla carried the heavy suitcases filled with gold/

As the pupil grows older, he learns to pack more grammatical constructions into his clauses.

A Grammar to Explain Sentence Combining Techniques

A model of transformational grammar was used in this investigation to explain how grammatical structures are embedded in base sentences. The grammar is based on transformational expansion rules devised by Chomsky (1957) (1965) and Robert Lees (1964), with some emendations by Owen Thomas (1965). "The embedding transformations," as Fillmore (1963) puts it, "identify sets of pre-sentences and expand symbols in terminal strings as some mutations of any of the identified pre-sentences." (p. 211) The transformational rules explain three basic operations of embedding pre-sentences: (1) deleting one or more segments of a string (2) transposing the segments and (3) adding the constant symbols.

In other words, a transformational description of the model sentence used to illustrate the way an older pupil would write could account for the embedding of three in-put sentences:

Base Sentence: The gorilla carried the suitcases.

In-put Sentences: The gorilla was friendly.
The suitcases were heavy.
The suitcases were filled with gold.

Sentence with Embeddings: The friendly gorilla carried the heavy suitcases filled with gold.

A description of the added grammatical structures, in transformational terms, is the catagorizing of sentence combining techniques.

Indices for Measuring Syntactic Control

Of paramount importance in a study of this type is a careful selection of indices that will measure the pupils' abilities to control grammatical structures.

Before 1960: Most indices in the measurement of written and oral responses were concerned with length of responses, length of sentences, distribution of declarative, imperative, and exclamatory sentences, kinds of subordinate clauses and their ratios to each other and to main clauses, related frequencies of parts of speech, and the cataloging of errors in morphology and parts of speech. In short, the indices can be termed "non-linguistic." Language research prior to 1954 has been summarized by McCarthy (1954). Other studies have been reviewed by Carroll (1960), O'Donnel (1967), and Mellon (1967).

Strickland's "Phonological Unit": Several studies in the early 1960's attempted to describe elementary school children's syntactic control in terms of frequencies of various sentence patterns, types of movable modifiers, and grammatical mazes. Strickland (1962) based her study on the analysis of twenty-five "phonological units" from each of her 575 subjects enrolled in the first six grades 1-6. In terms of structural grammar, the "phonological unit" is a sentence as determined by pitch, stress, and juncture of an utterance. Strickland's index, mean length of the phonological unit, was unsatisfactory as a sensitive instrument for measuring the levels of language maturity in the oral responses of elementary children. Consequently, as Strickland admitted, her related findings were inconclusive.

Hocker and Riling: Hocker (1963) and Riling (1965) closely followed Strickland's procedures and also encountered difficulty in the use of the phonological unit as an index of language maturity.

Loban's "Communication Unit": In addition to using the phonological unit in his analysis of oral responses by elementary school children, Loban (1963) used what he called the "communication unit." As a semantic unit, it was defined as a group of words which could not be further divided without the loss of its essential meaning. As a syntactic unit, it was a main clause with any attached modifiers. (p. 6) At the time, structural grammarians criticized Loban's incongruous definitions. However, in the research on syntax that followed, it appears that his investigation served as an important forerunner to more sensitive indices for determining levels of maturity in the uses of language.

Hunt's T-unit: Hunt's (1965) description of grammatical structures in the written responses of students in grades 4, 8, and 12, and superior adults is indeed a breakthrough in attempts to measure relative maturity of syntactic control. His T-unit mean length clearly appears to be a reliable index that can be easily used to measure normal growth of syntactic control. Furthermore, his descriptions and findings related to nominal structures strongly imply which types of sentence combining techniques are most representative of maturity.

Hunt defines the T-unit (short for minimal terminable unit) as "the shortest grammatically allowable sentence into which a writing can be segmented." (p. 21) The T-unit is a grammatical structure that contains one main clause capable of syntactic expansion by the embedding of clausal or nonclausal structures. It may be a single clause (a main clause)--like a simple sentence; or it may be a multiclause unit--like a complex sentence. Only one main clause is in a T-unit:

The small boy watched the birds. (one T-unit)
The small boy watched the birds fly south. (one T-unit)
As he walked to school, the small boy watched the birds fly south. (one T-unit)
The small boy walked to school, and he watched the birds fly south. (two T-units)

The following differences appeared in the mean lengths of T-units for three grade levels:

TABLE 2

MEAN LENGTH OF T-UNITS

Grade 4	Grade 8	Grade 12
8.6 words	11.5 words	14.4 words

From a sampling of nine writers from ATLANTIC and nine writers from Harper's, Hunt reported that the mean length of T-units by superior adults was 20.3 words.

Hunt also reported that the grammatical structures in Table 3 (p. 13) were significantly responsible for growth within the T-unit.

TABLE 3

STRUCTURES SIGNIFICANTLY RESPONSIBLE FOR GROWTH WITHIN T-UNIT

Variable	4	8	12	Significance
*Noun Clauses	186	204	353	
Gerunds	14	56	76	- .01
Factive Infinitivals	87	100	143	- .01
Modifiers of Nouns:				
Adjectives	554	895	917	- .01
Genitives	632	652	809	- .01
Prepositional Phrases	133	229	318	- .01
Infinitives	14	30	59	- .01
Participles	86	132	133	- .01
Relative Clauses	96	144	210	- .01

---

*Hunt computed the noun clauses used in direct discourse and listed the level of significance at - .05. The noun clauses in direct discourse were not recorded in this table.

The Peabody Team: From Peabody College, O'Donnell, Griffin and Norris (1967) analyzed the syntax of oral responses from pupils in grades K-1-2-3-5-7 and the written responses from pupils in grades 3-5-7, and reported that the T-unit index was highly reliable for measuring normal growth of children's control of syntax. However, they did raise some question about the scorings of subordinate clauses as sensitive measures of linguistic maturity. In speaking, nominal, adverbial, and relative clauses were all used often by kindergarten children. In writing there were no significant increases in the use of noun clauses. Trying to interpret normal growth patterns in the findings of the Peabody Report was, at times, difficult, since no controls were established to account for IQ or socio-economic differences between the groups of pupils at the various grade levels.

The mean IQ score of the pupils in grade 5, for example, was significantly lower than the mean IQ score of pupils in grades 3 and 7. Undoubtedly some of the fifth graders' lower mean scores related to the use of grammatical structures are attributed to IQ.

Adding Non-clausal Structures: The Peabody Report did suggest that non-clausal types of structures involving deletion transformations might be better measures to describe syntactic growth. (p. 98) A recent unpublished analysis by Hunt also suggests that the increased embedding of non-clausal structures are highly indicative of maturity. Figure 1, Hunt's analysis of samples from pupils in grades 4, 6, 8, 10, 12, graphs a transitional growth pattern in pupil's syntactic control. Hunt projects his findings over 32 parameters in reporting on five variables: percentages of main clauses, subordinate clauses, compound predicates, added structures less than predicates, and parts of T-units not analyzed. Most representative of continuous growth are the added structures less than predicates. Somewhat misleading in this illustration may be the decrease in subordinate clauses in grades 10 and 12. From previous studies by Hunt (1965) (1967), it can be inferred that the decrease of subordinate clauses is chiefly due to older pupils choosing not to use as many adverb clauses. Relative clauses do show a marked increase from grades 4 to 12 and to the skilled adult. From the samples of writings by average pupils, noun clauses do increase significantly from grades 4 to 12; however, the writings by skilled adults and superior twelfth graders do not indicate that noun clauses serve as an adequate index for maturity.

Mellon's Study: In a recent study which investigated the influence of a unique plan of instruction for teaching transformational grammar to seventh graders, John Mellon (1967) modified Hunt's T-unit but essentially followed the same procedures employed by Hunt. Two major differences in Mellon's scorings were:

1. All clauses of condition, concession, reason, and purpose were scored as separate T-units, since Mellon felt that logical conjunctions such as "if," "although", and "because" are T-unit connectors in much the same way as coordinate conjunctions are. (See Figure 2 for a rationale that might be given.)

2. All traditionally labeled "adverb clauses" of time, place, and manner were scored as relative clauses whose head nouns had been deleted.

In his analysis, Mellon regarded only those transforms which operated as expansions of constituents in base sentences. Undoubtedly, Mellon's establishing of new constraints for the boundaries of a T-unit is most appropriate, since no conclusive evidence has been given to indicate that pupils' use of adverbial clauses is indicative of linguistic maturity. However, his rationale for scoring the

Figure 1

RATE OF OCCURANCE OF MAIN CLAUSES, SUBORDINATE CLAUSES, COMPOUND PREDICATES AND ADDED STRUCTURES LESS THAN PREDICATES

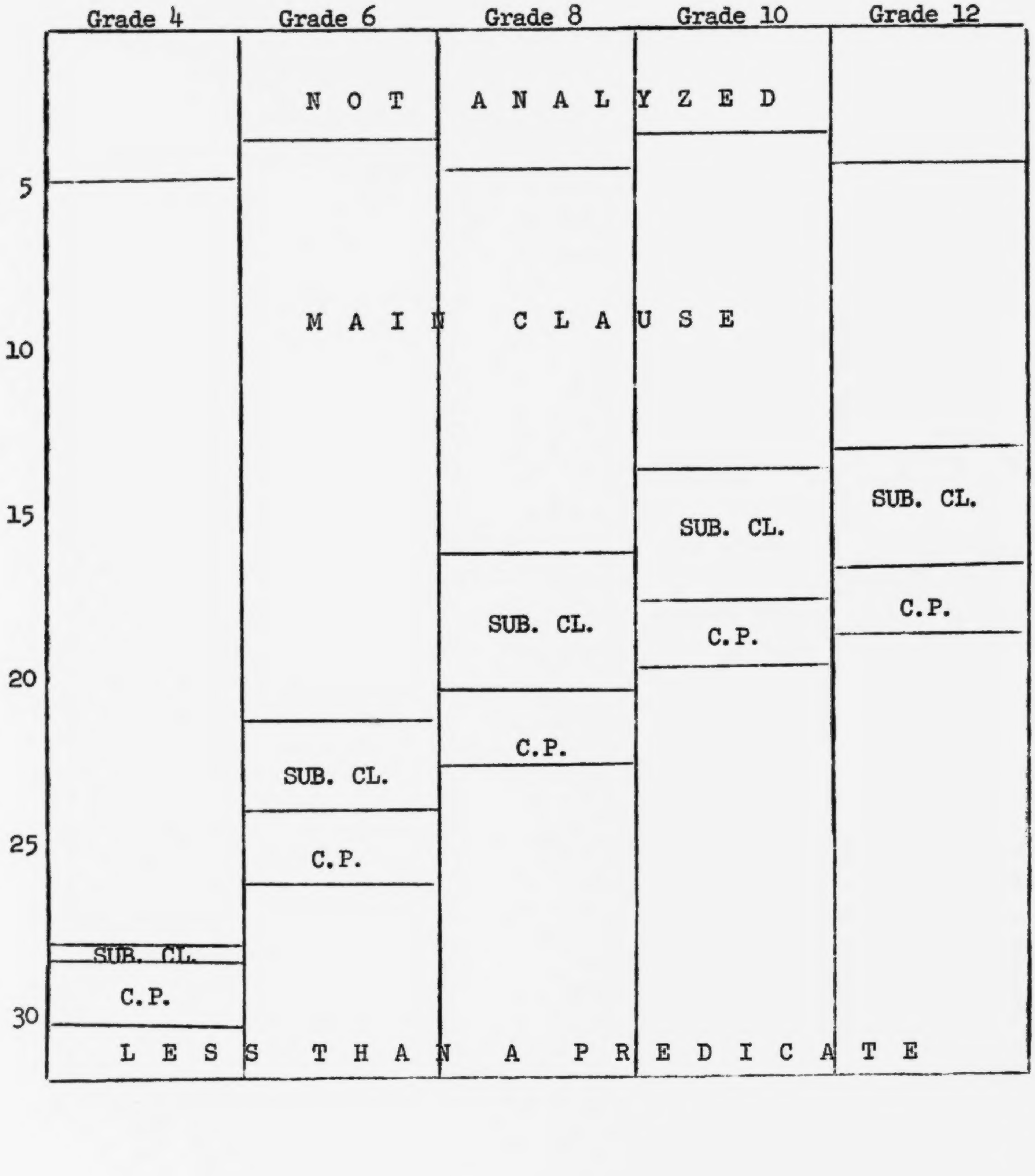
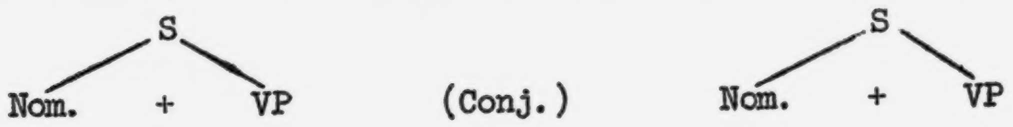


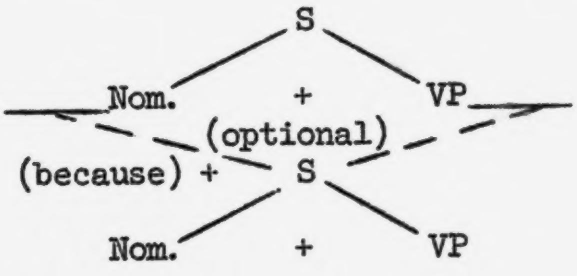
Figure 2

BASIC SYNTACTIC DIFFERENCES IN THREE SENTENCE COMBININGS

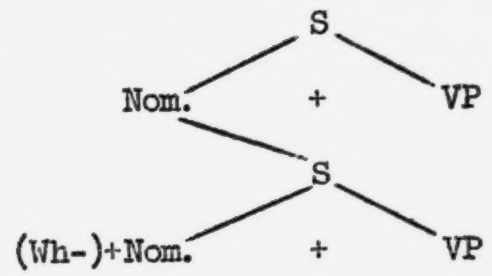
1 Compound Sentence: The tiger laughed and we laughed.


S
Nom. + VP
(Conj.)
S
Nom. + VP

2 Complex Sentence (with Adverb Clause): The tiger laughed because we laughed.


S
Nom. + VP
(optional)
(because) + S
Nom. + VP

3 Complex Sentence (with Relative Clause): The clown who wore the red suit was the funniest.


S
Nom. + VP
S
(Wh-)+Nom. + VP

The main syntactic difference between the clausal conjoinings in 1 and 2 is that in 2 the slot for conjoining is optional. Also, note that the "because" clause does not expand a constituent in the base sentence as a relative clause does.

adverbial clauses of time, place, and manner appears somewhat bald. A formal description of how "before," "as," "since," "while," and "after," clauses operate as relative clauses with the head words deleted might have been convincing--especially since this notional count is relatively new in linguistic analyses. The point is: the reader was given no logical basis for Mellon's division of scoring.

In addition to using T-unit mean length as an index for maturity, Mellon used several other indices to intensively analyze the syntactic fluency of the pupils in his study: Subordination-Coordination Ratio; Frequencies of Nominal Clauses, Nominal Phrases, Relative Clauses, Relative Phrases, Relative Words, and Embedded Kernel Sentences--all based on a rate of 100 T-units; Cluster Frequency (percentage of T-units containing one or more clusters of modification); and Mean Maximum Depth Level (the average level of the most deeply embedded sentence in T-units containing one or more embeddings). His study provided overwhelming evidence that the experimental groups drilled on transformational grammar out-performed the control and placebo groups in writing more syntactically mature T-units.

Mazes and Garbles: Other indices have been used to measure problems of syntactic fluency in speech and writing. Loban, Strickland, and Riling recorded false starts and meaningless repetitions which did not add up to meaningful communication in phonological units. The term "mazes" was given to these errors which interfered with the phonological aspect of continuity in language fluency. Hunt, on the other hand, recorded what he called "garbles," which are written word tangles that make interpreting the structural and lexical meaning of a T-unit impossible. O'Donnell, Griffin, and Norris also recorded garbles, which in their terms were a combination of Loban's maze and Hunt's garble. Of all these studies, only Loban's suggested that the maze can be used as a reliable tool in language analysis. Loban reported that during the first four years of schooling, the subjects as a whole decrease the number of mazes and the words in the mazes." (p. 82)

Transformational Failures: In a transformational analysis of two ninth grade groups' written responses, Bateman and Zidonis (1964) recorded five types of sentence combining transformational failures for comparisons of pre-post error reduction scores. They also computed ratios of error-free sentences to total sentences. Bateman and Zidonis's catagorizing of types of transformational failures is, indeed, perceptive. However, their using the sentence as a grammatical unit in measurement distorts the implications of the ratios of error-free sentences to total sentences. Mellon offers an intensive review of the Bateman-Zidonis investigation.

Comparisons of Syntactic Control in Writing and in Speaking

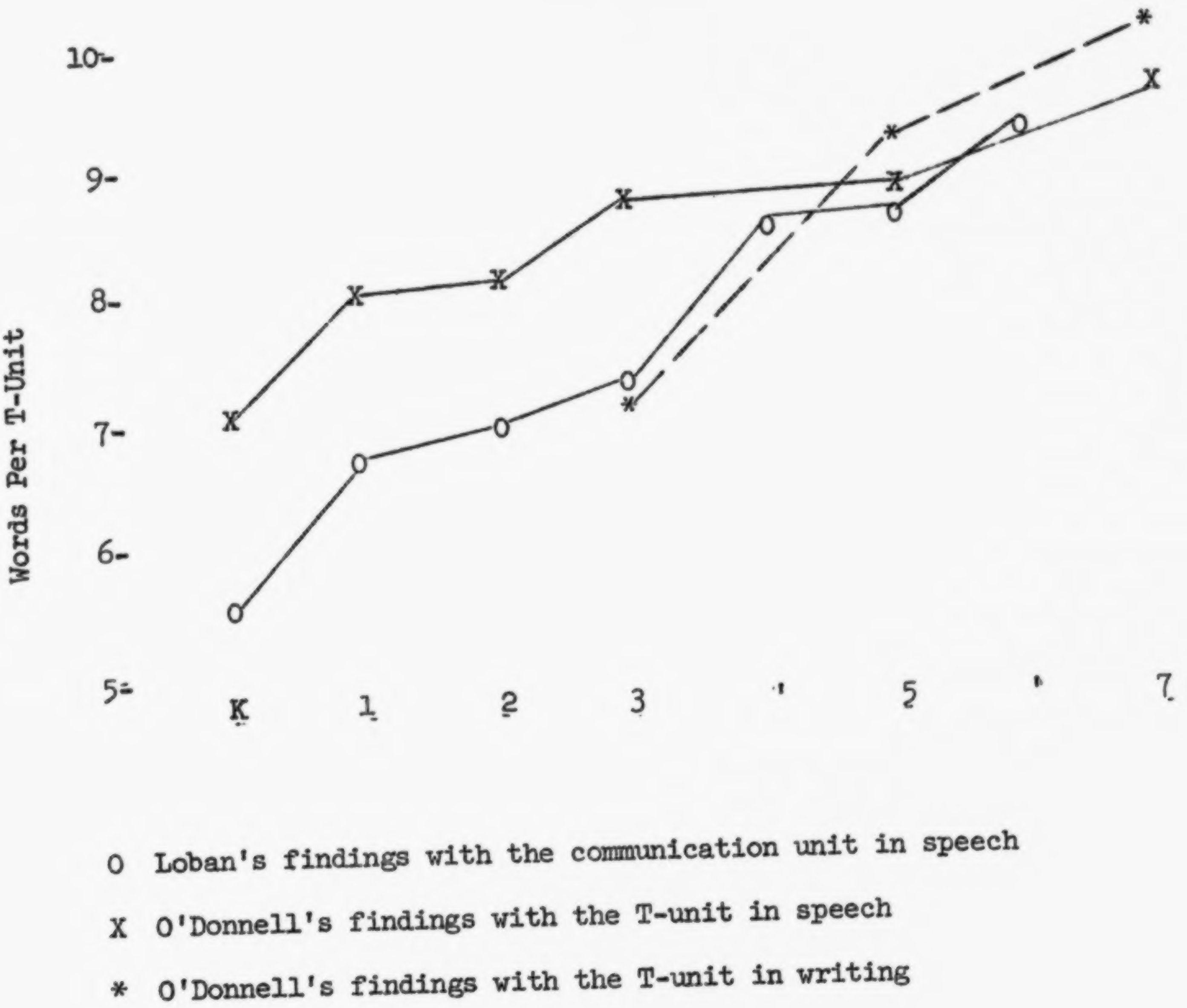
That young pupils' language control is better in speech than it is in writing is, of course, common knowledge. Learning to handle the secondary symbolic language of writing is difficult business. From studies by Loban (1963), Hunt (1965), and O'Donnell (1967), it can be inferred that pupils in the primary grades have greater syntactic control in their speaking than they do have in their writing; and that by grade 5, pupils have reached a transfer gap in developmental control, at which point their syntactic control in writing develops much more rapidly than their syntactic control in speaking. (See Figure 3) It seems a reasonable assumption that, for primary pupils, the act of writing "screens out" the use of some syntactic structures. If this is true, a cross-analysis of sentence combining techniques could be very useful in this study, since sufficient evidence has supported the notion that the I.T.A. pupils write significantly more than T.O. pupils. This cross-analysis could help to determine how the I.T.A. medium influences sentence combining techniques in writing. Comparing the written with the oral responses might best be approached with these two considerations in mind:

1. The representations of the pupils' syntactic control in writing and speaking will be significantly different; consequently, direct comparisons of the two types of responses should be projected only if they can contribute to a better understanding of language competence. A comparison of one group's oral responses with another group's written responses would be out of the question.

2. Inter-group and intra-groups comparisons may suggest that speech can be used as a base in determining the acquisition of control over syntactic structures in writing.

Figure 3

T-UNIT DIFFERENCES IN WRITING AND SPEAKING



Grammatical Density in First Grade Texts

Purpose: The purpose for examining the grammatical density in texts was to determine if the syntax in the pupils' texts books might have influenced the pupils' use of grammatical structures in writing or speaking.

Sentence Patterns: Five years after the Strickland (1962) study, investigations were still being made to determine if text books included the basic sentence patterns that young people speak. Unfortunately, this stress on sentence patterns in researching texts has been overstressed. It would seem that the key to determining levels of syntactic difficulty of the "quality differences" between the language levels of the text and the language level of the pupil is not something as superficial as sentence patterns, but rather the density of the grammatical structures within the various types of base sentences. The latest developments in readibility, as summarized by Bormuth (1967), are measurements related to grammatical complexity syntactic depth, modifier distance, and the number of transformational embeddings within the base sentences.

Clause Length: At the 1966 NCTE Convention in Houston, Hunt called attention to LaBrant's "mean clause length" as a simple and reliable index for measuring syntactic difficulty in reading. It might be inferred that the longer clause contains more sentence combining transformations with deletions than the shorter clause. Of course, this would not be necessarily so in the case of sentence length. That is, it can be assumed that a compound sentence is more difficult to read than a single clause with many single words and phrases operating as deletions of embedded sentences. Hunt also added that the number of subordinate clauses does not vary with syntactic difficulty.

Implications for a Procedural Plan

Sample Size: In previous I.T.A. studies, the writing sample sizes were very small. Chasnoff collected two samples that are small enough to be typed on a 4 X 6 card. In Mazurkiewicz's study, most of the pupils' written responses are less than 150 words. The approximate sample sizes in other studies are larger, mainly because they represent a different mode of communication or a different grade level: For the oral responses in Grade 1, Strickland and O'Donnell collected samples that average close to 250 words per pupil; the average oral sample in Loban's 1963 study is over 600 words. For the written responses, in grade 3, O'Donnell's average sample is 225 words. The samples from each of Hunt's fourth graders is 1,000 words in writing. The adequacy of sample size might best be determined by the age group--especially in the case of writing, and the purpose for which the samples are to be used. For first grade pupils, a sample between 150-300 words is an adequate representation of the pupils' performances in writing. For the purposes of this study, an adequate sample in speech is between 250-300 words. Samples of writing and speaking responses are included in the Appendix.

Sex Differences: It appears to be a widespread notion that girls are generally more facile in linguistic expression than boys. However, O'Donnell's study found that boys out-performed the girls on every grade level except grade 5. Since there is a difference in the number of boys and the number of girls in each of the groups for this study, a special analysis of variance could be made to determine any significant differences.

Socio-Economic Differences: Previous reports by Loban (1963) and Bernstein (1960) have indicated strong correlations between socio-economic positions and pupil performance in controlling syntactic structures. It would seem imperative that there be no significant differences between the socio-economic scores of the groups, and there are none in this study.

Summary

I.T.A. research has claimed that writing by pupils in I.T.A. programs is far better than the writing of pupils in other programs. By "better" I.T.A. research has meant that the I.T.A. pupils write more words or more polysyllable words. Equating more words and syllables with "better writing" is seriously misleading, since neither mean length of responses nor mean number of polysyllable words is regarded as an adequate index to determine differences between levels of writing performances. On the other hand, recent normative studies of sentence combining techniques used by pupils in writing and speaking have indicated that the ability of the pupil to grammatically add to his main clauses is analogous to the ability of the pupil to write or speak on some level of maturity. That is, an analysis of the pupil's control of syntax can justifiably be considered an index of the pupil's ability to compose sentences.

For the purposes of this study, the indices for measuring syntactic control should offer a reliable description of (1) the pupils' use of sentence combining techniques that are most indicative of growth in writing and speaking, and (2) the pupils' failures to use correct grammatical structures in sentence combining.

Findings by Hunt, and O'Donnell, and Mellon suggest that continuous growth in writing is best indicated by the frequency of transformational embeddings in noun slots. However, some questions may be raised about the use of noun clauses as an index, since Hunt and O'Donnell found that noun clauses are not sensitive indicators of pupils' ability to add to the main clause.

Also, Hunt's T-unit length index appears to be a reliable index for measuring normal growth in syntactic fluency. However, Mellon found reason to modify the boundries of the T-unit in order to measure what he considered optimal growth. A logical rationale seems to be missing from Mellon's scoring of some adverbial clauses as separate T-units and others as expansions of the main clause; however, his attitude toward adverbial clauses of condition, concession, reason and purpose is important to note, since previous research has given no conclusive evidence to prove that the pupils' learning to add adverbial clauses contributes to a pattern of continuous growth in acquiring the ability to make syntactic embeddings. This investigator, therefore, feels that all adverbial clauses should be reported in secondary findings and should not be regarded as reliable indices for maturity, and that Hunt's T-unit, rather than Mellon's, is most appropriate, but that the reliability of Hunt's T-unit mean length will be determined by other indices used in this study.

A recording of sentence combining transformational failures could also be used in this study to describe more completely how pupils control their grammatical structures in writing and speaking.

And for purposes of examining the grammatical density in the texts used by the two groups of pupils, LaBrant's mean clause length could serve easily as a reliable index.

CHAPTER 2

METHOD

Subjects

The subjects were 136 white, first grade pupils from the West Lafayette Community Schools. Three schools were chosen as sources, all three drawing from a professionally oriented community in a university town. Three intact classes were used for I.T.A. instruction; three for T.O.

This study included subjects on the basis of the following criteria: (1) Pupils had to be enrolled since the beginning of the school year (2) Pupils had to be unilingual (3) Pupils had to be free of any handicap judged sufficient to limit performance. Nine pupils were excluded for failure to meet these criteria. The resulting groups included 74 I.T.A. pupils and 62 T.O. pupils.

Five independent measures describe the group differences: Sex, Kulhman-Anderson Non-Verbal Intelligence Test, Hollingshead Two Factor Index for Social Position, Chronological Age in Months, and the Metropolitan Readiness Test total score.

TABLE 4

I.T.A. - T.O. GROUP DIFFERENCES

Variable	I.T.A.			T.O.		
Sex	Boys 40 Girls 34 Total 74			Boys 30 Girls 32 Total 62		
	Mean	SD	Range	Mean	SD	Range
IQ**	118.56	10.79	157-95	124.87	13.61	157-101
ISP	16.00	7.66	51-11	15.55	9.08	51-11
CA	82.61	3.94	93-75	82.44	4.64	95-72
Read.	59.36	3.65	66-48	57.78	4.68	41-25

Readiness scores for I.T.A. represent scores for 72 subjects.
Readiness scores for T.O. represent scores for 46 subjects.
Mean scores of both groups were adjusted for missing numbers.

**Difference is significant at <.01 level.

All levels of significance were determined by an analysis of variance technique, except for levels of significance of the Metropolitan Readiness scores, which were determined by a *t* test. SD and Range scores indicate a slightly larger spread of scores within the T.O. group than within the I.T.A. group.

On the evidence of the independent measures, the I.T.A. and T.O. groups are slightly different in IQ. To treat the differences, an analysis of covariance could be made, with the IQ scores as covariates. Previous linguistic research by O'Donnell (1967) may warrant treating sex differences with a two way unequal cell analysis of variance. Both the analysis of variance and the analysis of covariance, were made in this study. Measures for readiness, chronological age, and social position indicated no significant differences between the two groups.

Table 5, describing the differences between the groups chosen to respond orally, also indicated a slight difference of IQ in favor of the T.O. group. To treat the difference, an analysis of covariance was made, with the IQ scores as covariates. Other independent measures indicated no significant differences between the groups.

TABLE 5

I.T.A. - T.O. DIFFERENCES FOR RANDOM GROUPS RESPONDING IN SPEECH

Variable	I.T.A.			T.O.		
Sex	Boys 16 Girls 14 Total 30			Boys 16 Girls 14 Total 30		
	Mean	SD	Range	Mean	SD	Range
IQ**	116.57	12.40	157-95	123.33	15.84	157-101
ISP	15.93	8.40	51-11	15.80	8.53	47-11
CA	81.93	3.44	87-76	82.43	5.76	95-72
Read.	59.45	3.40	65-48	57.14	4.70	64-41

Readiness scores for I.T.A. represent scores for 29 subjects. Readiness scores for T.O. represent scores for 22 subjects. Mean scores were adjusted for missing numbers.

**Difference is significant at <.01 level.

[illegible]

The major differences between the I.T.A. and T.O. mediums used with the subjects of in this study are three: alphabet, proportionate emphasis given to writing and speaking, and materials for instruction.

The T.O. classes used the conventional alphabet consisting of twenty-six letters. The I.T.A. classes used an interim alphabet of forty-four graphic symbols, twenty-four of which were traditional symbols and fourteen of which were augmentations. The alphabet is basically phonemic; and no capital letters are used. All the I.T.A. subjects made the T.O. transition in reading by June 1.

Since the I.T.A. pupils wrote without the teachers' help sooner than the T.O. pupils did, more stress in the I.T.A. classes was given to writing. I.T.A. pupils began writing independently in October, whereas T.O. pupils did not start until November. The I.T.A. teachers had their pupils write in class for about three hours each week, whereas the T.O. teachers had their pupils write about half that time. The stress on writing in the I.T.A. classes was possible since the pupils were able to work independently and without duress. On the other hand, the T.O. teachers used more time for oral work with the entire class.

The basic reading texts were essentially different in both groups. I.T.A. texts consisted of nine 1966 basic readers from Initial Teaching Alphabet Publications. The T.O. texts included five 1961 basic readers from Ginn and Company. Mean clause length differences between the two sets of basic readers suggest that the grammatical density of the I.T.A. texts is significantly greater than the grammatical density of the T.O. texts. (See Appendix for a description of differences.) Both groups used individualized reading materials, also.

Teaching Personnel

Absolutely no research has ever been given to suggest that teacher competency in teaching and in speaking influences the way pupils grammatically add to their sentences. However, all six teachers involved in this study were judged as "highly competent" by their principals and this investigator. Some comparisons between the two groups of teachers are as follows.

Teacher Data

	I.T.A.		T.O.	
Teacher	Degree	Years Exp.	Degree	Years Exp.
A	M.S.	22	M.S.	9
B	B.S.	6	M.S.	2
C	M.S.	6	M.A.	12

Before the first writing assignment was administered, the six teachers and the investigator met on three occasions to discuss procedures and the feasibility of the plan to collect a total of 300 words in writing from each pupil by the end of ten assignments. Each teacher felt that the anticipation of 300 words from each pupil was realistic.

Serious attention was given to the matter of writing topics for the ten assignments. The investigator and the six teachers compiled a list of ten topics which they felt would best allow the pupils to write freely. Individual teachers were to be free to select topics from the list or to develop similar assignments that would fit more appropriately what the class was studying at the time the assignment was to be given. (See Appendix for a description of topics and instructions that were given to teachers.)

From April 3, 1967 to June 9, 1967, each teacher gave her class one writing assignment per week until the ten assignments were completed. With each assignment, the pupils were allowed to write for no more than thirty minutes and for no less than twenty minutes. All assignments were written in class. Pupils who were absent when the assignments were given had to make up the assignments, unless they already had written well over 300 words.

The teachers helped the pupils with spelling problems; however, they did not make any grammatical additions or structural variations in the pupils' writings.

Collecting Oral Responses

The procedures adopted for taping the oral responses studied in this research were as follows:

1. A method of random sampling was used to determine which pupils in each of the groups were to be taped. Thirty in each group were selected. (See Appendix for description of random sampling method.)

2. All recordings were made within a two week period.

3. The investigator served as the only interviewer.

4. Before interviewing members from a class, the interviewer visited with the class for one day to become acquainted with the pupils.

5. All pupils were invited to record. Occasionally pupils not selected through the sampling did record; however, their recordings were not counted.

6. All recordings were made in conference rooms. The investigator met with three or four of the pupils at the same time.

7. Each pupil was told that his recording was a part of an experiment; however, he was not told the purposes of the experiment.

8. The investigator attempted to collect at least 300 spoken words from each pupil in an interview that began with the question: "What would you like to do this summer?" The investigator used follow-up questions to allow the subject adequate opportunities for responding. Each pupil spoke for approximately five minutes. (See Appendix for transcriptions of interviews.) The topic question was determined after the investigator tried various questions in a pilot taping of pupils who were not subjects in this study.

From the sixty pupils who were selected for this phase of the study, twenty (ten I.T.A. and ten T.O.) were re-taped to determine the reliability of scores from the first taping. A method of random sampling was used to determine which twenty of the sixty were to be selected. All twenty of the pupils were given the same question: "What funny things have happened to you or to people that you know?" Each taping lasted approximately five minutes.

Transcriptions of all oral responses were typed by two linguistically oriented English teachers who gave careful attention to pitch, juncture, and stress signals but marked intonation patterns with standard devices of orthography, which worked sufficiently well for this phase of the study. At least three playbacks were made to check for accuracy.

Eliminating Parts of the Responses

Before analyzing the responses, the investigator and his assistant reviewed an arbitrary set of "ground rules" that determined what types of syntactic structures would not be a part of this study. The following were eliminated from the pupils' responses:

1. Direct dialogue in written responses.

2. Sentences repeated for rhetorical stress: "I saw it! ~~I saw it~~!"

3. Words repeated more than once for rhetorical stress: "It went up and up ~~and up and up and up and up and up~~."

4. Sentences not containing a finite verb: "I can." (as a reply)

5. Word tangles that would make an analysis impossible: "In we for out to are might."

6. Syntax directly borrowed from the interviewer or from the title of a written assignment: If the title of the written assignment was "If I were a teacher . . .," and if the student wrote "If I were a teacher, I would take my students on a field trip," the "if" clause was eliminated since it was a direct borrowing of the teacher's syntax.

7. Interjected clauses such as "I think" in the expression: "This is, I think, the best book I ever read." (The investigator felt that the recording of these responses might distort counts on noun clauses.)

8. Speech responses such as attention claimers ("Well"), sounds to indicate pauses ("Oh", "uh"), the expressions "yes" and "no" in sentences such as "Yes, I am going."

Boxing-in T-units and Counting Words

The chief investigator or assistant marked all T-units in this study. No problems were encountered in scoring T-units, even though first graders punctuated incorrectly in many cases.

For each subject's set of written and oral responses, the investigators boxed-in and numbered each T-unit until the 300th word. The 300th word signalled the last T-unit to be scored for a subject's set of responses. Each T-unit was then typed on a linguistic worksheet for analysis. (See Appendix for sample of worksheet.)

The following "ground rules" were used for word counting.

1. Contractions counted as two words: I'll, can't, I'll and so forth.

2. Noun compounds such as the following counted as two words: girlfriend, policeman, and moon monster.

3. Nouns such as anything, whoever, somebody, were scored as one word.

4. Prepositions such as inside, within, and into counted as one word.

5. Numbers, names of games, and proper nouns counted as one word items.

The obvious differences between rule 2 and rules 3, 4, and 5 is that the rule 2 permits word count credit to be given to noun adjuncts which may be transformational embeddings.

Scoring of Sentence Combining Transformations

The purposes of this phase of the study were to compare sentence combining techniques used by I.T.A. and T.O. pupils and to determine if pupils in one group combined more sentences within T-units. The aim here was to record sentences which were "embedded" constituents in the deep structure of a generative grammar.

After each T-unit was typed on a linguistic worksheet, the investigators recorded those structures which would result from sentence combining transformations. The "embedded" sentences recorded are of two types: (1) Those which occur in nominal slots and (2) Those which occur in what has been accepted traditionally as adverbial slots. It is important to note that this investigation was primarily concerned with structures that occupied nominal slots, since previous research has indicated that various embeddings within these slots are most representative of linguistic maturity. Embeddings of sentences in adverbial slots are reported as secondary findings.

The investigators used the following descriptions of surface structure for recording types of embedded sentences.

I. Embeddings in Nominal Slots

A. Embedded Sentences in Nominal Slots as Marked by the Following Types of Structures Which Operate as Noun Heads

1. Nominal Clauses: Factive and Interrogative Nominals

   I knew that he would come.

   We knew who was there.

2. Nominal Phrases: Action, gerundive, and infinitival nominals and derived noun phrases

   Verb stem + ing marked action and gerundive nominals:

   Building castles on the beach was the most fun.

   The ant's loud singing bothered everyone.

   Action and gerundive nominals preceded by the preposition "by" or "without", were also scored here: Without falling, the cat made it to the top.

To + verb stem marked infinitival nominals:

My wish is to have a 1,000 pound candybar.

The infinitival nominals following main verbs were restricted to those indicated by Lees (1966). Infinitives which were constituents in catenated verb strings were not scored: I want to go.

Infinitival nominals which retain subjects and may be marked by "for" were given a separate scoring here: We watched the flowers bloom.

Prepositional phrases in noun slots without nouns as heads marked the derived noun phrases:

Across the lake seemed far away.

A separate scoring was made of noun constructions functioning as non-restrictive appositives, with the understanding that the appositives were derived from conjoined sentences. Restricted appositives were marked as noun modifiers of nouns.

B. Embedded Sentences in Nominal Slots as Marked by the Following Structures of Modification with Nouns as Heads

1. Relative Clauses: Clauses which follow the noun they modify:

   The boy who is across the street plays Batman.

   Derivable from: The boy is across the street.

2. Phrases Derivable from Relative Clauses: In transformational grammar, these phrases are explained as reductions of relative clauses, with deletion rules for the relative and the verb be.

   Prepositional phrases which serve as post modifiers to nouns:

   The boy across the street plays Batman.

   Derivable from: The boy who is across the street plays Batman.

"Of" phrases frequently referred to as predeterminers (a lot of toys) were not scored.

Verb stem + -ing or past participial endings (single words or phrases) which modify nouns:

The lady walking across the street is my teacher.

Derivable from: The lady who is walking across the street is my teacher.

Also scored here were verb + ing or past participial endings (single words or phrases) which can be identified with constituents in the base sentences, but may be considered by some as "non-restrictive modifiers": He ran to the room, hoping to find the surprise. Expressions such as "dancing lesson" and "swimming pool" were not scored here. Gerundive adjuncts were scored as noun modifiers of nouns.

To + verb stem: Verb phrase used as a modifier of the noun which precedes it.

The boy to go there is John.

Derivable from: The boy who is to go there is John.

3. Genitives: Genitive forms which serve both as pre or post modifiers of nouns:

I was the leader of the troop.
Jim's coat fell on to the floor.
My book was torn.

Derivable from: The troop has a leader.
Jim has a coat.
I have a book.

4. Adverbs Derivable from Relative Clauses which have deleted relatives and be verbs.

The man outside is my friend.

Derivable from: The man who is outside is my friend.

5. Adjectives Derivable from the in-put Sentence Nom. + Be + Adj. which undergoes relative clause transformations with obligatory rules for pre-nominal positioning:

   The sad clown cried.

   Derived from: The clown was sad.

   Post-nomininal adjectives as in the sentence I wish that something special would happen were given a separate count.

   Articles, demonstratives, and enumerating and qualifying determiners were not counted.

6. Noun adjuncts in endocentric compounds:

   I watched the ant parade.

   Other examples: moon monster, circus man, mouse holes, and toy cars. Noun compounds such as weeping willow, bobcat, sunflower, scarecrow and butterfly were not scored.

   The embedded structures might be described simply as derivable from two sources:

   Subject-Predicate: The cars are toys--toy cars

   Subject-Verb-Prepositional Object: The monster is from the moon--moon monster.

II. Sentence Embeddings in Adverbial Slots (to be reported as secondary findings)

The traditional label of "adverbial modifier" is indeed a very inexact and confusing term used for too many types of syntactic relationships. This label is inexact because its common usage has confused form,and syntactic relations. Consequently, in listing types of structures in the surface grammar which signal sentence combining transformations in an adverbial slot, it was necessary for the investigator to add notional labels and descriptions that discriminated forms, operations, and the implied functions of adverbial modifiers. In this study, the "adverbial slot" is any filler slot which is not used for expansion at a nominal node in a branching tree diagram.

A. Movable Adverb Clauses

I left because the Martians came.

Because the Martians came, I left.

B. Other Adverb Clauses

1. Degree Clauses that Follow Adjectives:

The lights were so bright that I could barely see.

2. Adjective Complement Clauses:

She was glad that he came.

3. Eliptical Clauses not containing a finite verb:

He worked because I couldn't.

C. Infinitivals

1. Infinitival Nominals of Purpose:

I stopped to wind my watch.

2. Infinitival Complements of Adjectives:

He was sad to leave.

D. Other Types

Recordings of other "adverbial" structures were so few in number and of such variety that the investigator chose to place them all under the category of "Other Types" in reporting the rate of occurrence. However, raw frequency scores of each type are recorded in the Appendix.

1. "By" phrases that are attributive to the noun phrase and the verb phrase:

By mistake, my mommy got sick.

Attributive to: My mommy's getting sick was a mistake.

2. "For" phrases that are attributive to the noun and verb phrase in a similar way:

We got wet for nothing.

Attributive to: Our getting wet was for nothing.

3. *"-LY" Adverbs attributive* to the noun phrase and the verb phrase:

   When I was a little girl, my daddy *accidentally* cut my finger off.

   Attributive to: *My daddy's cutting my finger off was an accident.*

   Adverbs of degree such as *really* and adverbs of time, such as *finally* and *usually* were not scored.

4. *Clause adjuncts with tense deletions:*

   He walked and walked, *the butterflies following him*.

5. *"Because of" phrases which may be reductions* of because clauses:

   I love hornets best of all *because of their brown and gold stripes*.

6. *"With" Phrases*

   Instrumental "with" phrases: If I were a teacher, I I would snap him on the head *with a pencil*.

   Concomitant "with" phrases: He went up town *with her*.

   The investigator is aware that, in order for the "with" phrases to signal sentence combining transformations, the transformational rules had to allow for a string of two or more base phrase structures. Thus, the investigator made distinctions between the phrase structure rules which permit using *The boy played with the toys* and those which permit *The boys played with the girls* and *The boys played (basketball) with their shirts on*.

These structures in adverbial slots were catalogued but were never considered as indices for linguistic maturity. Coordinates of nominals, predicates, and modifiers were also recorded, but again were never regarded as sensitive indicators of maturity. This investigator makes no pretense that the list of embedded sentences in adverbial slots is a complete list of all possible "adverbial" embeddings in a grammar. The list merely represents the embedded "adverbial" structures which were used by the pupils in this study.

Sentence Combining Failures

In trying to determine which group of pupils had more problems in formulating grammatically correct syntactic units the following types of transformational failures were recorded:

1. Single Base Transformational Failures which were word omissions and deletion failures that were not caused by sentence combining transformational operations:

   Examples: It was nice party.

   The dog it is brown.

   No spelling, capitalization, handwriting, pronoun reference, or subject-verb agreement problems were scored here. Single base failures were recorded only for comparisons to be made with sentence combining failures.

2. Sentence Combining Transformational Failures (to be referred to as T-Failures). Several classifications of these were made:

   A. Garbles, as described in the Hunt and O'Donnell reports:

   In we go out to go so are might.

   B. Omission of a required grammatical constituent in a transformation:

   I wish that could have longer recess.

   C. Failure to use a required deletion with a transformation:

   My second wish is that I wish that this was candyland.

   D. Omission of subject or verb in a main clause:

   And ran off the moon, and ran all the way.

   E. Other sentence combining failures in the operations of a transformational grammar:

   I wanted Mrs. Brown would let us play.

   Sometimes instead of stopping, they are put on a crane and go swimming.

3. Sentence Conjoining Problems with the use of logical conjunctions:

> My second wish would be to fly in the sky because people would be ants.
>
> I would be seven because I think it is a good age because then you get to stay longer in school because school is fun.

Major Variables

The six major variables used for comparing the syntactic differences between the I.T.A. and T.O. groups are listed below. Each was computed on the basis of the mean scores of each pupil's performance.

Mean T-unit Length:	Total words divided by total number of T-units.
Sentence Combining Transformations in Nominal Slots Per 100 T-units:	Total number of sentence combining transformations listed under Roman numeral I divided by total number of T-units, quotient times 100.
Relative Clause Transformations Per 100 T-units:	Total number of relative clauses divided by total number of T-units, quotient times 100.
Nominal Transformations with Deletion Rules Per 100 T-units:	Nominal phrases divided by total number of T-units, quotient times 100.
Relative Transformations with Deletion Rules Per 100 T-units:	Relative phrases and relative adverbs divided by total number of T-units, quotient times 100.
Garble Index:	Ratio to measure sentence combining failures: Total number of sentence combining failures (numbers 2 and 3 on pages 35 and 36) divided by the total number of sentence combining transformations, quotient times 100.

CHAPTER 3

FINDINGS

Since this investigator has criticized previous I.T.A. research for concluding the I.T.A. pupils write better because they write more, it seems most appropriate that the findings here first include a description of the amount of writing used from both groups and the rate at which the pupils completed their contributions of samples. Then an intensive analysis of the grammatical structures can be presented, the juxtapositioning of which will allow the reader to realize any relevancy between facility for getting thoughts down to the writing tablet and syntactic fluency. Following the analysis on the written responses will be a similar analysis of the oral responses, here again the purpose being to relate findings that may help in better understanding how the I.T.A. medium influences the pupils' syntax in writing. And then by a cross analysis of both oral and written responses, some implications about differences in the uses of grammatical structures in speaking and writing will be possible.

Written Responses

Amounts of Writing

Over 49,000 Words Examined: Samples of the pupils' writing may be noted in the Appendix. First grade pupils in both groups provided the investigators with a very adequate sample of writing. Table 6 represents the total number of words examined in order for the investigators to find 300 words in T-units for each pupil. However, most pupils wrote much more for the ten assignments than what is indicated by this table. The investigator found no reason to count the words that went beyond the T-unit marked by the 300th word, since the object of this study was syntax and not total length of responses.

TABLE 6

TOTAL WORDS EXAMINED AND ANALYZED

	I.T.A. (N=74)		T.O. (N=62)	
Words Examined	27,823	100%	21,227	100%
Words Eliminated	5,975	21%	5,433	24%
Words Analyzed in T-units	21,848	79%	15,794	76%

Over 11,000 Words Eliminated: Twenty-three percent of the writing had to be eliminated for various reasons: long initial borrowings from the title of an assignment; direct dialogue; questions addressed to the reader (What do you think?); graphemic symbols for monster sounds, screeches, and animal noises; "Good-by's" and "The End's" for the reader; repeated words; countdowns on rocket trips; garbles; and bad cases of handwriting. The aim in eliminating parts of the writing was for the investigators to have responses that were syntactically analyzable and relevant. Most of the writings were very easy to read. Very few eliminations were due to handwriting problems.

TABLE 7

PUPILS COMPLETING 300 WORDS IN ANALYZABLE T-UNITS

Assignments:	1	2	3	4	5	6	7	8	9	10	%[1]
I.T.A.:			2	5	6	16	17	9	8	4	(92)
T.O.:				1	3	5	3	5	4	5	(53)

TABLE 8

PUPILS COMPLETING 10 ASSIGNMENTS BUT NOT ACHIEVING 300 WORDS IN ANALYZABLE T-UNITS

I.T.A. Pupils	%[1]	Words	T.O. Pupils	%[1]
3	(4)	250-299	8	(16.5)
1	(1.5)	200-249	9	(18.5)
2	(2.5)	150-199	5	(10)
0		Below 150	1	(2)

[1] Group percentages were based on the number of pupils in Table 7 and Table 8: I.T.A. - 73; T.O. - 49. Pupils in Table 9 were not figured in these percentages.

TABLE 9

PUPILS NOT COMPLETING 10 ASSIGNMENTS NOR ACHIEVING 300 WORDS

	I.T.A.			Words Achieved	T.O.		
Assignments Not Completed:	1	2	3		1	2	3
				250-299		1	
	1			200-249	5		
				150-199	3	2	
				Below 150			2

I.T.A. Pupils Write More: As the investigators had anticipated, the I.T.A. pupils were more prolific than the T.O. pupils in producing words. Use of the I.T.A. Alphabet and practice in writing appear to be a definite aid in the pupil's encounter with the graphemic aspect of writing performance. Table 7 illustrates that the percentage of pupils completing 300 words in analyzable T-units was greater for I.T.A. than it was for T.O. The rate of assignments at which these completions were made is also indicative of I.T.A. pupils' advantage in getting the printed word down to the page. Unfortunately some assignements were not re-administered to pupils who were absent when the original assignments were given, and these "incompletes" should be taken into account by the reader. Table 9 reports the words achieved by pupils not completing the ten assignments. Since the transformational analysis is based on frequencey of occurrence at the rate of 100 T-units, the failure of some pupils to achieve 300 words in analyzable T-units is not a handicap to either group in this study.

A Preliminary Analysis of Written Responses

Since much has been written about differences in primary level achievement, it was considered necessary to control for such differences by use of a factorial design. Consequently, a two-way unequal-cells analysis of variance technique was used with method as one factor and sex as another. No significant differences were found between the dependent variable scores made by the boys and the scores made by the girls. Consequently, the uneven distribution of sexes in the two groups was not regarded as a factor in subsequent analyses. Of the thirty-four dependent variables used in this phase of the investigation, Table 10 lists four which the investigator considered to be the most crucial. Scorings of other dependent variables never approached significance, and listing them all is unnecessary at this point.

TABLE 10

ANALYSES OF VARIANCE OF FOUR CRUCIAL VARIABLES

Variable	Sex	I.T.A.	T.O.	Mean	F-Fatio
T-Unit Length	Boys	7.09	8.04	7.52	0.02
	Girls	7.02	8.17	7.55	
Nominal SCTs	Boys	58.76	70.65	64.18	0.02
	Girls	59.88	70.40	64.68	
Relative Clauses	Boys	1.49	3.79	2.54	0.20
	Girls	2.92	2.65	2.79	
Garbles	Boys	2.48	4.65	3.42	0.09
	Girls	2.61	4.49	3.54	

At 1 and 132 df.

Levels of Significance

F-Ratio required at $<.05$: 3.92
F-Ratio required at $<.01$: 6.00

Analyses of Sentence Combining Techniques

Control of IQ Differences: In order to control the IQ differences between the two groups, a series of analyses of covariance were made, with IQ as a covariate (See Table 12).

Six Major Variables: Six major variables were chosen on the basis of recommendations made in earlier studies. (See Chapter I.) However, it should be realized that all variables used in this study are necessary to describe the syntactic operations of the responses since no single index of maturity adequately characterizes syntactic fluency. Mean length of T-units and mean totals of sentence combining transformations in nominal slots (Nominal SCTs) were chosen primarily from implications found in the Hunt (1965) and O'Donnell (1967) studies. The [1]Garble Index is really an augmentation made from implications found in the Mellon (1967) and Bateman-Zidonis (1962) studies. And counting noun phrase and relative phrase-relative adverb deletion transformations was inferred from O'Donnell's recommendations. Genitive transforms were not considered with the relative phrase deletions since they are transformations requiring special rules and since, according to previous studies, their use has not been as highly indicative of growth as other structures. Noun adjuncts and adjective modifiers of nouns were recorded as types of Nominal SCTs but were not catagorized under the cover of "relative words" since the syntactic operations of each can be significantly different.

TABLE 11

MEAN NUMBERS OF T-UNITS AND WORDS

	Words	T-units	W/T-unit
I.T.A.	294.63	42.10	7.06
T.O.	255.10	31.86	8.11

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[1] I also owe this to Jack Dunsing, my research analyst.

TABLE 12

MEAN SCORES OF SIX MAJOR VARIABLES
Written Responses, with IQ as a Covariate

	Variable	I.T.A.		T.O.		F-Ratio
		Obtained Mean	Adjusted Mean	Obtained Mean	Adjusted Mean	
	W/T-Unit	7.06	7.08	8.11	8.08	27.14**
	Total Nominal SCTs	59.28	59.49	70.52	70.28	8.17**
	Relative Clauses	2.14	2.40	3.18	2.88	.70
Deletion Transforms	Noun Phrases	3.98	3.98	2.72	2.73	3.00
	Relative Phrases	7.69	7.67	5.78	5.79	4.79*
	Relative Adverbs	0.42	0.43	0.25	0.24	.94
	Garble Index	7.84	7.35	15.05	15.63	16.32**

[1] At 1 and 133 df
F-Ratio required at <.05: 3.92
F-Ratio required at <.01: 6.83
* Significant at or beyond <.05 level
** Significant at or beyond <.01 level

W/T-unit: Mean length of T-units.

Nominal SCTs: Mean number of embeddings in nominal slots, at the rate of 100 T-units.

Relative Clauses: Mean number of relative clauses, at the rate of 100 T-units.

Deletion Transforms: Mean number of selected transformations with deletions, at the rate of 100 T-units.

Garble Index: Ratio between the total number of sentence combining transformations and the total number of sentence combining failures.

Contrasts in three sets of findings may be examined in Tables 11 and 12. First, it can be noted that the mean length of T-units by the T.O. group is considerably greater than the mean length of T-units written by the I.T.A. group, even though the I.T.A. group wrote many more words. (See Table 11) A one word difference here is a significant difference, since the normal rate of T-unit expansion is relatively slow. Secondly, the T.O. group's T-units are larger partly because more Nominal SCTs are packed within the T-units; however, the Nominal SCTs that are transformations with deletions were used more often by the I.T.A. group. The third important contrast here is between the Garble Index scores achieved by both groups. In the ratio between the total number of sentence combining transformations and the total number of sentence combining failures per pupil, the I.T.A. group had significantly fewer failures. To explain the implications of these contrasts, it is necessary to examine in more detail what techniques were used by each group in expanding T-units and what sentence combining failures were made.

Nominal Clauses: The difference between the mean scores of the two groups appears to be phenomenal. The T.O. group used twice as many nominal clauses as did the I.T.A. group. Furthermore, the T.O. group used significantly more nominal clauses in writing than it did in speaking, whereas the I.T.A. group used significantly fewer in writing than it did in speaking. (See Tables 13, 24, and 25) In the analyses of nominal clauses, two questions warranted answers: Why the extreme difference between the two groups in writing? And, why the flip-flop of nominal clauses in writing over speaking for the T.O. group? The latter needs to be answered first.

TABLE 13

FREQUENCY OF EMBEDDED SENTENCES IN NOMINAL SLOTS AS MARKED BY THE FOLLOWING TYPES OF STRUCTURES WHICH OPERATE AS NOUN HEADS

An Analysis of Covariance, with IQ as a Covariate

	Variable	I.T.A.		T.O.		F-Ratio
		Obtained Mean	Adjusted Mean	Obtained Mean	Adjusted Mean	
	Nominal Clauses	5.42	5.66	11.28	10.98	20.99**
Nominal Phrases	Verb Stem + "ing"	1.15	1.14	1.02	1.04	0.08
	"To" + Verb Stem	2.63	2.65	1.66	1.63	3.41
	Prep. Phrases	0.07	0.08	0.05	0.05	0.22
	Total Nominal Phrases	3.98	3.98	2.72	2.73	3.00

**Significant at < .01 level

1. Why more nominal clauses in writing than in speaking for the T.O. group?

A reasonable explanation might be that the different stimuli for the written and oral responses influenced the choice of syntax--better yet, the choice of verbs. The oral responses were mostly narrative and descriptive accounts of the pupils' telling where they have been, where they would like to go, what they had done, or what they would like to do. Most of the written assignments were also narrative or descriptive; however, one assignment topic which both groups used was entitled "If I had three Wishes..." This point is of particular importance since 67% of the T.O. group's nominal clauses were preceded by the verb "wish". (See Table 14 and the Appendix for listings of verbs preceding nominal clauses.) Hypothetically, when the T.O. pupils responded to I wish SOMETHING, they substituted a nominal clause for the word SOMETHING. But considering that both groups had the same assignment, the above explanation does not support the result of I.T.A. pupils having fewer nominal clauses in writing than in speaking. Some clarification on this point is given in the next answer.

2. Why did the I.T.A. group have fewer nominal clauses?

After carefully re-examining all of the noun clauses and T-Failures involving the word "wish", it appeared evident to the investigators that the I.T.A. pupils were attempting to incorporate reduced forms of what T.O. pupils were using as nominal clauses. The following sentences illustrate some variations of these reduced forms:

A. I wish for a horse.

B. I would wish for a longer recess.

C. I would choose a horse.

D. I would like a kitten.

Verbs in C and D were popular substitutes for the verb "wish". No embeddings were scored with the above sentences. However, in some cases, infinitival nominal embeddings were in sentences expressing a wish:

My second wish would be to fly in the sky.
(Note that the infinitive phrase scores for the I.T.A. group approaches significance in Table 13.)

In other cases, the I.T.A. pupils failed in using a grammatically correct form for a transformational reduction: (See Table 14.)

E. My wish would be oceans.

F. My third wish would be dogs and cats.

G. My second wish is to have I have a red desk.

H. My third wish is a I had a green house.

Apparently, the I.T.A. pupils chose to incorporate more reduced forms which, as in sentences A -- D, were combining transforms. This in no way suggests that I.T.A. pupils did not know how to use nominal clauses. It merely suggests that they chose to incorporate more reduced forms and in some cases failed to produce a grammatically correct reduction of a transformation. These findings also add a confirmation to previous findings by Hunt (1967) and O'Donnell (1967): that the noun clause is an ambiguous index for maturity.

TABLE 14

FREQUENCIES OF NOMINAL CLAUSES AND T-FAILURES INVOLVING THE VERB "WISH"

	I.T.A.	T.O.
Nominal Clauses preceded by "wish"	24	145
T-Failures involving "wish"	46	8

Nominal Phrases: It is quite conceivable that a given relationship of selected variables may be fortuitous or even spurious. However, since the relationship of variables under the heading of "transforms with deletions" has already been hypothesized in this study, the investigator does not feel that the findings related to nominal phrases is by chance alone. The F-Ratio for "To" + Verb stem and total nominal phrases approaches significance, suggesting that a larger sample of writing may reveal a significance. Also, it is reasonable to assume that since the difference between the mean scores of the deletion transforms in Table 15 are indicative of a significant difference at the $<.05$ level, the total mean score of all deletion transforms may also be significant: I.T.A. - 12.09; T.O. - 8.73.

TABLE 15

FREQUENCY OF EMBEDDED SENTENCES IN NOMINAL SLOTS AS MARKED BY THE FOLLOWING MODIFICATIONS WITH NOUNS AS HEADS

	Variable	I.T.A.		T.O.		F-Ratio
		Obtained Mean	Adjusted Mean	Obtained Mean	Adjusted Mean	
	Relative Clauses	2.14	2.40	3.18	2.88	0.70
	Prep. Phrases	4.63	4.60	3.76	3.80	1.48
Relative Phrases	Verb Stem + "ing" or Past Participial Endings	1.83	1.84	1.28	1.27	1.95
	"To" + Verb Stem	1.23	1.24	0.73	0.72	2.29
	Total Relative Phrases	7.69	7.67	5.78	5.79	4.79*
	Genitives	14.51	14.38	15.96	16.12	1.38
	Relative Adverbs	0.42	0.43	0.25	0.24	0.94
	Pre-Nominal Adjectives	11.18	11.03	13.78	13.95	3.43
	Noun Adjuncts	11.21	11.22	13.85	13.84	3.42

*Significant at $<.05$ level

Relative Clauses: The differences in mean scores is not significant here. The obtained means for both groups indicate a slight difference in favor of the T.O. group; but the scores within the groups range with greater difference than the means of the groups. The standard deviation for the I.T.A. group is 2.47; for the T.O. group it is 4.17. The standard deviations and the adjusted means suggest that the IQ influenced the use of relative clauses, confirming Hunt's finding that the use of the relative clause may be indicative of mental maturity.

Relative Phrases: The mean scores of all three types of relative phrases are slightly in favor of I.T.A., but only the mean for the total number of relative phrases is significant. The difference between the means appears to be slight. However, the importance of this finding might best be realized by relating the findings of other analyses here. The choice of the I.T.A. pupil to use more relative phrases and other selected transforms with deletions, and the choice of the I.T.A. pupil to use fewer clausal types of sentence combining transforms (See Table 20), and the choice of the I.T.A. pupil to begin fewer T-units with "and" (See Table 22) suggest that the I.T.A. medium influences first grade pupils to use sentence combining techniques that can be attributed to older pupils. In other words, normative studies on syntax have indicated that the more mature pupils (1) use fewer "ands" in combining T-units, (2) embed more transforms with deletions, and (3) eventually may choose to use fewer adverbial and nominal clauses. (See Chapter 1) Furthermore, since the grammatical density of the clauses in the I.T.A. texts is significantly greater than the grammatical density found in the T.O. texts (See Appendix), it seems reasonable to assume that the syntax in the I.T.A. texts may have had a direct influence on the pupils' choice of non-clausal structures.

Genitives: The genitives were scored separately for reasons given earlier in this chapter. As anticipated, no significant differences were found between the groups on the basis of this variable.

Relative Adverbs: There is no doubt that a much larger writing sample is needed before the scoring of this type of embedding can be indicative of any significant difference. However, for future studies, grouping relative adverbs with post-nominal adjectives, nominal phrases and relative phrases seems logical, since all are derivable from relative clause transformations, and since all may operate as post-nominal modifiers.

Pre-nominal Adjectives and Noun Adjuncts: The F-Ratios indicate no significant differences between the mean scores. It may be interesting to note that the means for pre-nominal adjectives and noun adjuncts are higher in the written responses than in the oral responses. (See Table 27) Some implications about these findings are made in Chapter IV.

TABLE 16

SPECIAL COUNTS ON THREE STRUCTURES

Variable	I.T.A.		T.O.		F-Ratio
	Obtained Mean	Adjusted Mean	Obtained Mean	Adjusted Mean	
Post-Nominal Adjectives	0.51	0.54	0.35	0.31	1.36
Subject + Infinitive	1.44	1.41	2.54	2.58	6.50*
Non-Restrictive Appositive	0.85	0.86	0.96	0.95	0.09

*Significant at <.05 level

Special Counts: All of the structures recorded in Table 16 are totalled in the Nominal SCT count. However, they are given a special count here for one of two reasons: (1) Their syntactic operations were significantly different than other embedded transforms in nominal slots, or (2) Relatively recent debate on transformational theory has raised some question about their descriptions. (See Chapter 2) The only significant difference in Table 16 is with the group means for the Subject + Infinitive, significant at the <.05 level. However, serious doubt is raised about the value of these differences here since the investigator found that a larger percentage of Subject + Infinitive constructions for the T.O. group was preceded by verbs that could be categorically distinguished as inoperable with PRO forms. The following sentences illustrate this point:

[I watched SOMETHING → I watched them act.
They acted.

* [My father made SOMETHING → My father made me angry.
I was angry

*Not operable

(See Appendix for a complete listing of verbs preceding Subject + Infinitive constructions.)

TABLE 17

SENTENCE COMBINING TRANSFORMATIONS AND FAILURES

Variable	I.T.A.	T.O.	F-Ratio
SCTs per T-Unit	0.88	1.15	22.56**
T-Units per pupil	42.10	31.86	97.33**
Garbles per pupil	2.34	4.61	26.56**
Garble Index	7.84	15.05	16.32**

**Significant at <.01 level

Sentence Combining Failures

Table 17 is, perhaps, the most important table in the study. Very simply, it indicates that the I.T.A. group writes significantly more T-units, but that the T.O. group embeds significantly more sentences within the T-unit. And in the ratio computing the number of garbles per the number of sentence combining transformations, the findings indicate that the I.T.A. group averages about half as many failures per 100 SCTs. (The SCTs per T-unit is the total number of sentence combining transformations in both nominal and adverbial slots.) All differences in mean scores are highly significant here. (See Appendix for raw scores on types of sentence combining failures.)

Secondary Findings Related to Written Responses

By the term "secondary findings," the investigator means findings on those sentence combining techniques that are not attributive to optimal growth in syntactic addition. For example, Group A's using more adverbial clauses than Group B could hardly be a logical indication that pupils in Group A were more linguistically mature writers. Previous studies have in no way showed that the pupils' ability to add adverbial clauses contributes to continuous growth in learning how to embed sentences. However, the secondary findings are, indeed, important in completing a description of each group's selections of sentence combining techniques in writing. Of particular importance are the findings related to movable adverb clauses and coordinates (Tables 18-22).

TABLE 18

FREQUENCY OF SENTENCE EMBEDDINGS IN ADVERBIAL SLOTS

Variable	I.T.A.	T.O.	F-Ratio
Movable Adverb Clauses	9.28	17.97	35.79**
Other Adverbial Clauses	1.66	2.17	1.41
"Adverbial" Infinitives	1.51	1.86	1.06
"Other Types"	1.51	1.13	0.61
Total Adverbial Structures	13.92	23.62	28.54**

**Significant at $<$.01 level

TABLE 19

RAW FREQUENCY COUNTS OF MOVABLE ADVERB CLAUSES

Adverb Clauses Of:	Introduced By:	I.T.A. (N=74)	T.O. (N=62)
TIME	"when"	100	77
	"while"	10	0
	"before"	11	6
	"until"	8	8
	"after"	4	3
	"as"	2	3
CAUSE	"because"	84	164
	"so"	10	16
CONDITION	"if"	40	33
	"unless"	0	1

Coordinated adverb clauses were not included in the above figures: T.O. -- 54; I.T.A. -- 6.

Table 18 indicates a dramatic difference in the means, significant at the <.01 level. The T.O. group chose to use almost twice as many adverb clauses as did the I.T.A. group. Table 19 indicates that the mean differences are effected largely by the T.O. pupils selecting to use "because" clauses.

Other findings on "coordinates" (Table 21) and percentages of "ands" conjoining T-units (Table 22) might also be related here. In Table 21, the difference between the means on "Coordinates of Modifiers" is largely due to the T.O. group coordinating "because" clauses within T-units: The T.O. group coordinated 54 such clauses; whereas the I.T.A. group coordinated 6. The percentages of T-units conjoined by "and" (Table 22) is also highly indicative of the T.O. group's frequent combining with "and."

TABLE 20

FREQUENCY OF SUBORDINATE CLAUSES

Variable	I.T.A.	T.O.	F-Ratio
Relative Clauses	2.14	3.18	0.70
Nominal Clauses	5.42	11.28	20.99**
Movable Adverb Clauses	9.28	17.97	35.79**
Subordination Index	1.17	1.33	48.24**

**Significant at .01 level

TABLE 21
FREQUENCY OF COORDINATE CONSTRUCTIONS

Variable	I.T.A.	T.O.	F-Ratio
Coordinates of Nouns	8.04	10.69	3.27
Coordinates of Modifiers	1.84	4.08	12.14**
Coordinates of Predicates	4.48	6.96	2.84
Total Coordinates	14.39	21.73	10.18**

**Significant at .01 level

TABLE 22
PERCENTAGES OF "ANDS" INTRODUCING T-UNITS

Group	"Ands"	T-Units	%
I.T.A.	547	3,124	14.3
T.O.	570	1,981	28.9

The secondary findings convincingly show that the T.O. pupils conjoin many more sentences than the I.T.A. pupils do. However, these conjoining methods should not be construed as sophisticated types of sentence combining techniques. For one, previous studies have indicated that younger pupils introduce more T-units with "and" far more often than do the older pupils. This is one reason for the stringy style that so often is found in young pupils' writing. (See Chapter 1) Secondly, the subtlety of the syntactic distinctions between clauses introduced by "because" and clauses introduced by "and" (See Figure 2, Chapter 1) and previous findings on adverb clauses provide no logical rationale for considering clausal conjoinings with "because" to be indicative of linguistic maturity. In fact, just the opposite might be stated: That children learn how to combine sentences with "and" and "because" very early in writing.

The differences reported as secondary findings and those reported on transforms with deletions explicitly demonstrate a major difference in the sentence combining techniques used by each group. The implications of these differences are discussed in Chapter 4.

Oral Responses

Over 21,000 Words Examined

While examining transcripts of the pupils' oral responses, the investigators found it necessary to eliminate 25% of the 21,973 words. Reasons for eliminations are given in Chapters 2 and 3. The words analyzed in T-units totalled over 16,000, with the T.O. group contributing more words than the I.T.A. group.

TABLE 23
TOTAL WORDS EXAMINED AND ANALYZED

	I.T.A. (N=30)		T.O. (N=30)	
Words Examined	10,298	100%	11,675	100%
Words Eliminated	2,417	23%	2,966	25%
Words Analyzed	7,881	77%	8,709	75%

Analyses of Sentence Combining Techniques

Few differences were found in the oral responses from both groups. Of all the variables for embeddings in nominal slots, only one was significantly different: The T.O. group scored 2.51 relative adverbs per 100 T-units, whereas the I.T.A. group scored 0.72. The difference was significant at the $<$.01 level. (See Tables 24 and 25.) Only two other differences were significant; both are secondary findings slightly in favor of the T.O. group. (See Table 26.) The finding on the relative adverb (Table 24) may suggest that the T.O. group embeds slightly more transforms with deletions in speech. However, on the basis of one variable, it may be unwise to conclude that there are major differences between the two groups' choices of sentence combining techniques.

Re-Taping 20 Pupils

In a re-taping of twenty pupils (ten I.T.A. and ten T.O.), the investigator found that the mean T-unit length for the second taping was slightly lower for both groups. However, the adding of the means from both tapings again indicated that there was very little difference between the two groups' mean scores:

	I.T.A.	T.O.
Means from First Taping:	8.66	8.75
Means from Both Tapings:	8.28	8.14

TABLE 24

ORAL RESPONSES
MEAN SCORES OF SIX MAJOR VARIABLES, WITH IQ AS A COVARIATE

Variable	I.T.A.		T.O.		F-Ratio
	Obtained Mean	Adjusted Mean	Obtained Mean	Adjusted Mean	
W/T-unit	8.53	8.54	9.15	9.14	2.22
Nominal Sct.	81.34	81.45	82.98	82.86	0.04
Relative Clauses	5.94	6.02	7.32	7.24	0.66
Nominal Phrases	2.45	2.61	2.20	2.04	0.50
Relative Phrases	7.58	7.67	8.22	8.14	0.10
Relative Adverbs	0.72	0.71	2.51	2.52	7.79**
Garble Index	8.67	8.52	6.58	6.73	1.49

**Significant at <.01 level

At 1 and 57 df.
Levels of significance: F-Ratio required at <.05: 4.02
F-Ratio required at <.01: 7.11

From the adjusted means and F-Ratios, it can be inferred that the variance of scores within each group was greater than the differences between the two groups.

TABLE 25

COMPARISON OF ORAL AND WRITTEN RESPONSES FOR THE 60 GROUP

		ORAL			WRITTEN		
	Variable	I.T.A. (N=30)	S[1]	T.O. (N=30)	I.T.A. (N=30)	S[1]	T.O. (N=30)
	W/T-unit	8.53	NS	9.15	6.92	NC*	7.88
	Nom. Scts	81.34	NS	82.98	58.60	NC*	68.78
	Nom. Cls.	7.36	NS	8.87	5.47	NC*	11.59
Nom. Phs.	"To" + Verb	.93	NS	.51	2.75	NC	1.67
	Verb + "ing"	1.53	NS	1.69	1.08	NC	1.09
	Prep. Phrase	0.00	NS	0.00	.09	NC	0.00
	Total Nom. Phs.	2.45	NS	2.20	3.91	NC	2.76
	Rel. Cls.	5.94	NS	7.32	1.62	NC	2.34
Rel. Phs.	Prep. Phs.	4.88	NS	4.34	4.24	NC	4.31
	"To" + Verb	1.26	NS	1.66	1.61	NC	.34
	Verb + "ing"	1.45	NS	2.23	2.19	NC	.50
	Total Rel. Phs.	7.58	NS	8.22	8.04	NC*	5.15
	Genitives	27.82	NS	27.93	14.96	NC	16.04
	Rel. Adv.	.72	<.01	2.51	.59	NC	.42
	Pre-nom. Adj.	11.65	NS	11.32	10.16	NC	14.26
	Noun Adjuncts	11.69	NS	10.90	11.31	NC	12.23
Special	Post-n. Adj.	.46	NS	.35	.55	NC	.38
	S + Inf.	2.56	NS	1.94	1.42	NC*	2.45
	Appos.	1.96	NS	1.75	.56	NC	1.11
	Garbles	3.00	NS	2.43	2.47	<.01*	4.57

[1] Significance:
NS Not Significant at the <.01 or <.05 level
NC Not Computed for significance
* Variables that were significant in the analysis of the total groups' written responses (N=136)

TABLE 26

SECONDARY FINDINGS IN A COMPARISON OF ORAL AND WRITTEN RESPONSES FOR THE 60 GROUP

	ORAL			WRITTEN		
Variable	I.T.A. (N=30)	S[1]	T.O. (N=30)	I.T.A. (N=30)	S[1]	T.O. (N=30)
Movable Adv. Clauses	9.42	NS	11.77	9.85	NC*	16.56
Other Adv. Clauses	1.17	<.05	2.95	1.60	NC	2.25
Adv. Infinitives	2.11	NS	1.35	1.25	NC	1.61
Other Types	2.09	NS	2.97	1.26	NC	.59
Total Adv.	14.80	NS	18.34	13.96	NC*	22.02
Coordinates of:						
Modifiers	1.29	NS	1.30	1.97	NC*	3.68
Nouns	9.65	NS	7.59	7.40	NC	11.16
Predicates	8.16	NS	10.88	4.00	NC	5.97
Total	19.10	NS	19.65	13.37	NC*	20.81
Total Scts per T-unit	1.15	NS	1.22	.86	NC*	1.11
Subordination Index	1.22	<.05	1.29	1.17	NC*	1.31
Percentage of "Ands" Introducing T-units	47.2%	NC	49.5%		NC*	

[1] Significance: NS Not Significant at the <.01 or < .05 level
NC Not Computed for significance
* Variables that were significant in the analysis of the total groups' written responses (N=136)

Oral and Written Responses of the 60 Group

The findings in the oral responses (See Tables 24-26) suggest that two groups of pupils, considered equal in age, cultural level, IQ, and achievement, will not vary significantly in linguistic maturity. It can be assumed that both groups of pupils in this study were equipped with essentially the same intuitive knowledge about sentence combining techniques. However, the findings from the written responses indicate that the I.T.A. medium directly influenced the pupils to use sentence combining techniques differently. In the written responses, the I.T.A. pupils (1) chose to conjoin fewer sentence with "and" and "because," (2) embedded more transforms with deletions, and (3) had fewer sentence combining failures. The implications of these findings are discussed in Chapter 4.

TABLE 27

FREQUENCY OF SIX MOST POPULAR SENTENCE COMBINING TECHNIQUES

Technique	Oral (N=60)	Written (N=60)
1. "And" Connecting T-units	48.00	22.00
2. Coordinates	19.37	17.09
3. Genitives	27.88	15.17
4. Movable Adverb Clauses	10.60	13.20
5. Noun Adjuncts	11.29	12.41
6. Pre-nominal Adjectives	11.48	12.36

Six Most Popular Sentence Combining Techniques

In a comparison of the sentence combining techniques most frequently used by the pupils in writing and speaking, the "and" connecting T-units was by far the most popular. Genitives and coordinates of nouns, modifiers, and predicates were also used frequently in both speech and writing. Other popular sentence combining techniques are listed in Table 27. Their frequent use may suggest that, intuitively, pupils learn these techniques very early.

Selected Transforms with Deletions

Previous studies have indicated that pupils will eventually learn how to incorporate more of the sentence combining techniques listed in Table 28. It might also be added that in all of the techniques listed below, the I.T.A. group scored higher than the T.O. group did in writing. In speaking, the T.O. group scored slightly higher with some of the techniques.

TABLE 28

FREQUENCY OF SELECTED TRANSFORMS WITH DELETIONS

Technique	Oral (N=60)	Written (N=60)
NOMINAL PHRASES		
1. Prep. Phrase	0.00	0.04
2. Verb + "ing"	1.61	1.08
3. "To" + verb stem	.72	2.21
RELATIVE PHRASES		
4. Prep. Phrase	4.61	4.28
5. "To" + verb stem	1.46	.97
6. Verb + "ing"	1.84	1.34
OTHERS		
7. Relative Adverb	.51	1.62
8. Post-nominal Adjective	1.85	.48
9. Relative Clause	6.63	1.98

Related Finding

TABLE 29

OBTAINED MEAN SCORES IN METROPOLITAN ACHIEVEMENT TESTS

Variable	I.T.A.	T.O.	F-Ratio
Word Knowledge	33.76	30.95	25.15**
Word Recognition	32.77	31.00	10.58**
Reading	40.82	35.65	20.64**
Math	59.15	57.47	6.80*
Total	166.50	155.69	20.42**

* Significant at .05 level
**Significant at .01 level
See Table 12 for df and F-Ratio scores of significance.

CHAPTER 4

CONCLUSIONS AND IMPLICATIONS

Does the I.T.A. medium provide a linguistic advantage in the way that pupils' grammatically add to their sentences?

It is quite conceivable that the I.T.A. medium conditions pupils to write with graphemic and syntactic constraints which are much different than the constraints for beginning writers using traditional orthography. These constraints can not be defined, but they can be described in terms of their effects on how first grade pupils grammatically add to their sentences. In the analyses of sentence combining techniques used by both groups in writing, three important differences were noted.

1. The T.O. pupils conjoined a greater number of T-units with "and" than did the I.T.A. pupils. The T.O. pupils conjoined 28% of their T-units with "and," whereas the I.T.A. pupils conjoined 14%. The number of "and" conjoinings within T-units was also significantly greater for the T.O. group: T.O. - 21.73; I.T.A. - 14.39. (Both scores based on frequency rate for 100 T-units.)

   The tendency of the T.O. group to conjoin sentences was also evident in the frequent scorings of "because" and "and because" clauses: T.O. - 218; I.T.A. - 90 (raw scores).

   The popularity of the "and" and "because" conjoiners by both groups (See Table 27) suggest that these techniques for "sentence combining" are learned relatively early in both speaking and writing. The frequent use of either would not necessarily indicate a high level of linguistic maturity. Instead, the overuse of either might suggest the opposite. The pupil who repeatedly links together series of independent clauses with "and" creates redundant pieces of rhetoric. The pupil who strings together a series of "and because" clauses does essentially the same thing. (The T.O. pupils coordinated 54 clauses with "and because"; whereas the I.T.A. pupils used only 6.) From the findings of this investigation, it seems logical to assume that the constraints of traditional orthography conditioned pupils to conjoin sentences with "and"; and "because".

In a study on Grammatical Structures Written at Three Different Grade Levels, Hunt pointed out that the younger, less linguistically sophisticated pupils conjoined more sentences with "and."

On the bases that these sentence combining techniques are undoubtedly acquired easily, are used often by young pupils and less frequently by older pupils; and on the basis that the I.T.A. medium influenced considerably fewer such conjoinings, it can be concluded that the I.T.A. pupils have a stylistic advantage.

2. Another important difference was the two groups' choices of sentence combining transformations in nominal slots. The T.O. group's scoring significantly higher on nominal clauses caused the investigator to re-examine all of the nominal clauses in order to detect a logical reason for the phenomenal difference between the two groups. It was discovered that the I.T.A. pupils had attempted to incorporate more clausal reductions that were not formally recoverable. (See Chapter 3) The I.T.A. group's transformational failures involving "wish" verbs also indicated that I.T.A. pupils had attempted reductions of nominal clauses. From these discoveries, three implications can be made: (a) a confirmation that I.T.A. pupils attempted more embeddings of transformations with deletions (See Relative Phrase Transforms in Chapter 3) (b) a confirmation to previous hints that the nominal clause may be an ambiguous index for determining linguistic maturity (See Chapter 1) (c) That the differences between the two groups' mean scores of total nominal sentence combining transformations may not be significant.

   The mean scores of relative phrase transforms with deletions also indicated that the I.T.A. pupils embed more clausal reductions than do the T.O. pupils. The difference between the mean scores of both groups was indeed, slight. However, in light of the findings on nominal clauses and related transforms with deletions, this finding is considered important. It should be pointed out that according to previous studies, the selected transformations with deletions have been highly indicative of continuous growth in the young pupils' achieving cognizance about sentence combining techniques. Furthermore, the rate at which these transforms are intuitively incorporated in writing is relatively slow. Therefore, the fact that the I.T.A. pupils attempted to include more transforms with deletions suggests that the I.T.A. pupils have a slight linguistic advantage in using more sophisticated methods of syntactic addition.

3. One of the most significant differences in the performances by both groups may be noted in the Garble Index scores. The T.O. group scored 15.04 sentence combining failures for every 100 sentence combining transformations; whereas, the I.T.A. group scored only 7.84. This appears to be substantial proof that the I.T.A. medium definitely aids young pupils in composing sentences.

From these three major findings on the written responses, it seems reasonable to assume that the graphemic and syntactic constraints influenced by the I.T.A. medium permit pupils to avoid sentence combining failures and to incorporate more sophisticated sentence combining techniques than those attributed to the T.O. group.

The findings from the oral responses unequivocally confirms the conclusions about the differences in the sentence combining techniques used by the two groups in writing. A transformational analysis of the oral responses showed no major syntactic differences between the two groups. It can be assumed, therefore, that both groups were equipped with essentially the same intuitive knowledge about sentence combining techniques in speaking but that the groups' choices of sentence combining techniques in writing were definitely influenced by the constraints of two different mediums: I.T.A., T.O.

Is there any evidence to support how the basic texts read by either group may influence the pupils' correct use of grammatical structures?

There is good reason to believe that the grammatical density of clauses in the I.T.A. texts aided the I.T.A. pupils in avoiding sentence combining failures and in embedding more transformations with deletions. The grammatical density of clauses is considerably greater in the I.T.A. texts than it is in the T.O. texts. (See Appendix) It seems logical to assume that the skills acquired in the process of decoding syntactic relationships within clauses can influence the use of encoding skills for syntactically expanding sentences in writing. It also seems logical to assume that if pupils are conditioned by reading short clauses without embeddings, the conditioning will contribute, little, if anything, to the pupils' acquisition of encoding skills for syntactically expanding sentences. Since the grammatical density of clauses was considerably greater in the I.T.A. texts than those in the T.O. texts, and since the I.T.A. group had significantly fewer sentence combining failures, it can be assumed that the syntax in the texts influenced the I.T.A. and T.O. performances. However, to conclusively prove this assumption, special controls not found in this study would be necessary.

What do the differences between the written and oral responses suggest about the pupils' acquisition of syntactic control?

Table 27 in Chapter 3 lists "Six Most Popular Sentence Combining Techniques" which apparently the pupils in this study have mastered in both writing and speaking. Comment about the use of "and" and "because" has already been given in this chapter. Added observations on the use of genitives, noun adjuncts, and pre-nominal adjectives might be added here.

In the case of genitive forms, mostly possessive pronouns were scored. Regarding young people's frequent use of possessive pronoun forms, two implications about children and language acquisition can be made.

(1) The pupils' selection of grammatical forms may be partially dependent on their cognition of how this world relates to them and to people they know and see. Identifying objects with people (people that children know and see) seems to be a very fundamental way of finding order in an environment. Consequently, the frequent use of forms such as my, yours, mother's and so on may be highly indicative of language forms used to identify a dominant order in children's lives.

(2) The next implication about genitive forms also ties in closely with pupils' acquisition of some noun adjuncts and some pre-nominal adjectives. In all three of these cases, the embedded transform usually consisted of one word: Kim's book, tall tree, moon monster. Of course, the genitive periphrases was also scored, but there were few of these at this grade level.

Recent studies on language recall and acquisition suggest that young children's generation of language forms, which in some cases might be considered by the linguist to contain a sentence combining transform, may be the result of conditioning rather than the result of children syntactically adding where they intuitively know recursiveness is allowable. (Horwitz, 1967) From the observations made in this study, the investigator felt that occasionally this might be true with the three forms being discussed here. At times, pupils used repeated expressions such as swimming pool, baby kittens, little people, mother +N, father +N, all of which were scored as containing embedded transforms. Occasionally, it did appear that pupils used "modifying" forms which the investigator felt were syntactically locked to the head of the construction. Of course, for the investigator to arbitrarily choose which noun adjuncts or pre-nominal adjectives transforms should count and which should not would extend this study beyond the boundaries of grammatical theory and into the field of neurophysiological behavior---which is not the object here. Consequently, no scoring distinctions were made. However, the investigator was sensitive to this problem, and did not list these three forms as major variables. (See table on major variables.)

Table 28, on the other hand, lists grammatical forms which these children have as yet to master in sentence combining techniques. The investigator feels that these constructions are probably most suitable for determining the element of recursiveness in language aquisition. (See Table 28.)

. . . . .

There is not reason to belabor the reader with further discussion about the analysis of variance with sex as a factor, since no significant differences were found.

. . . . .

Two Final Remarks

The investigator felt that the T-unit was extremely helpful as a descriptive tool but ambiguous as a measurement for determining linguistic maturity. Consequently T-unit length was not regarded as an index for the purposes of this study.

Finally, the investigator sincerely hopes that this study will be examined in proper perspective. The conclusions in this study should not imply that I.T.A. pupils should be indelibly marked "linguistically advantaged." The influence of other stimuli in the next few years to come will determine whether or not the post-I.T.A. and T.O. pupils loose or gain ground. Furthermore, it is hoped that this investigation may in some small way contribute to any educational pursuits for developing new stimuli that will condition post-first grade pupils to feel at ease with the graphemic and syntactic constraints in writing. Also, syntax, although it is important, is just one aspect of language to examine. Both groups of pupils had many outstanding points that do not fit the topic of this paper.

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APPENDIX A

MAZURKIEWICZ'S FINDINGS OF T-UNIT LENGTH IN WRITING OF POST-I.T.A. PUPILS

	2nd		3rd	4th
	Dec.	May		I.T.A.
Subjects	49	49	70	31
Running Words	78.79	84.10	108.3	138.7
T-Unit Length	*5.7	6.2	6.2	6.8
Clause Length	*6.08	5.97	5.74	6.4

*Evidently this is an analytical, arithmatical or typographical error since clause length can not be longer than T-unit length.

APPENDIX B

T.O. Samples of First Grade Writing

Student A (Wrote over 300 words)

1. When I grow up I would like to be an airplane hostess. Because I like to go up in an airplane. When the airplane goes up it feels funny. And I have another reason why I would like to be a airplane hostess. Because I would go to places that I have never gone to before.

2. If I could be an animal, I would be a tiger. Do you know why? Because when they run, they look so graceful. And also because they jump so high.

3. I wish I had a volcano that squirted pink lemonade out of it. Then I would not have gone through the trouble of getting a glass out of the kitchen. That is my first wish. I have two more wishes. And this is my wish. I wish that I had a pony because I could ride him all around. And I would name him Blacky. And I wish that I could grow a tree that never stopped growing and grows lollipops and everybody can eat them.

Student B (Wrote over 300 words)

1. I wish that I could have an underground volcano that shoots out candy and bubblegum and all the sweet things. And I have a private door so my mother does not know about it and an automatic airplane and a fountain that shoots out pink lemonade.

2. Once upon a time there was a little boy with red hair. He ran away from home because he was bossed around. He did not like this. That is why he mad. He had a tent too. The next day he met a old man. He gave the boy three wishes to the boy. First the boy wished he was handsome. His second wish he had a castle. Then his third wish he had a princess. The boy was back where he started.

3. If I was a teacher, the children in my class I would take them to Happy Hollow and spend the day there and have a picnic there. And I would let them cool off with a hose. The class would be dismissed. That's what I would do if I was the teacher.

Student C (Wrote 250 words)

1. I wish I could have a pony. Why? Because I like them and a golden cat and a golden dog and a golden tennis court and tennis balls and the whole Fort Knox and all the golden and food.

2. If I could be a teacher I would let the children go to play on the playground and play in the Kingston Pool and play soccer and to Happy Hollow and take sledge hammers to break rocks.

3. Mr. Bear was walking in the woods. He was looking for honey. But he used vines like Tarzan and he fell in the lake six times because the vine broke because he wanted to fly. But he found some honey and he had nothing to put it in so he put the honey in his pocket.

APPENDIX C

I.T.A. Samples of First Grade Writing

Student A (Wrote over 300 words)

1. When I grow up, I am going to be a dentist. I want to be one because my grandfather is a dentist. He gave me a filling. I like my grandfather because he is a dentist.

2. If I could be an animal, I would like to be a bull because a bull is rough. He charges when he sees red. I want to be one because I like to run. If you bother him, he will charge. A bull is big. A bull is a father cow. They do not give milk. They work in bull fights. They charge.

3. The worms were having a party. They had good cookies and happy talk. As quick as a bomb, the house began shaking. The worms bounced up and down. One worm said "What a surprise it is!" It was an earthquake. It made a mess. It killed one worm. Then it stopped. Everything came down.

Student B (Wrote over 300 words)

1. If I could be an animal, I would like to be a cat. I would be a tiger cat. I would have black and brown stripes and orange spots. I would be very little. I would be very fluffy. My mane would race about. I would always run. I would never walk. I would go all over the house. The reason I want to be a cat is because I love them.

2. When I grow up I want to be a dentist. I would like to look at people's teeth and see if they have any cavities. I would look very carefully and when I am done, I would let the children have a tool or a ring or a little car or a toy watch.

3. Once upon a time people gathering around tents. These tents are called circus tents. People are going to a circus. The bareback riders were out first. A strong man held the lady on his knee. Blacky, the horse, held the strong man on his back. Blacky was pitch black. The clown had a worried looking face. There were 7000 people there. When I was at a circus, I liked the lions and tigers jumping through the hoops.

Student C (Wrote 250 words)

1. Once upon a time, I was in the flying newspaper and I was famous because I went to Uranus. And I will be 21 years old. I took a short cut. I swam in the milkyway. I drank some milk in the milkyway. We stopped at a space station.

2. I teach dentists. I have one boy that had all his teeth rotten, so he ended with no teeth.

3. I want to be a carpenter. I have a good start. When I am 35 years old, I can use the milling machine. And I will make a metal star.

APPENDIX D

Clause Lengths of Texts

I.T.A. Books	Incomplete Clauses	Clauses	Wds.	W/Clause
Rides	1	26	154	5.92
Dinosaur Ben	1	74	352	4.75
Houses	0	67	371	5.54
A Game of Ball	7	375	1818	4.76
The Yo-Yo Contest	14	499	2667	5.32
Find A Way	35	914	4983	5.45
Book 5	13	980	5938	6.06
Book 6	14	1326	9197	6.94
Book 7	48	1728	10407	6.02
Totals	133	5989	35887	5.992

T.O. Books	Incomplete Clauses	Clauses	Wds.	W/Clause
My Little Red Story Book	32	112	348	3.11
My Little Green Book	8	333	1156	3.41
My Little Blue Story Book	20	481	1668	3.47
The Little White House	31	1542	6863	4.45
On Cherry Street	53	2220	11893	5.36
Totals	144	4688	21928	4.677

APPENDIX E

Administering the Writing Assignment
(Instructions to teachers)

From April 3, 1967 to June 9, 1967, each teacher will assign her class one writing assignment per week until the total number of ten assignments have been completed by each student. All assignments will be written in class.

The teacher should feel free to invent her own topic assignment and her own means for stimulating an effective writing response from her students. If the teacher gives her writing assignments as she is accustomed to -- this is fine. On the other hand, if she feels she must deviate from the usual kind of writing assignment, the director should be informed about the nature of the proposed assignment. Below are writing assignments which you have listed as those "usually given" to your first graders:

1. "What I Want to Be"
2. "Once upon a time . . . " (Story completion)
3. "If I could be an animal, I would be a . . . " (Sentence and paragraph completion)
4. "Three Wishes"
5. "Describing a Picture"
6. "If I were a Talking Pencil"
7. "I Remember"
8. "If I could be a famour person . . . "
9. "People in a Circus"
10. "If I could be a teacher for a day . . . "

For at least one of the assignments, allow your students to write about whatever they wish. Give them no topic.

The following are necessary conditions in the administering of your assignments:

1. Allow the student no more than thirty minutes and no less than twenty minutes to write.
2. If the student is not present when the assignment is made, allow him another time to make up the writing assignment only if he does not have 350 words.
3. Try to make this writing assignment a natural part of the student's learning process. Do not tell him that his paper will be analyzed.
4. Feel free to help the student with any spelling problem he may encounter.
5. Do not help the students to add grammatically to their sentences or to structurally vary their writing.
6. Try to encourage every pupil about some aspect of his writing, after he has completed the writing assignment.

After each assignment is collected, please fill out the "assignment sheet" and include it with each set of papers.

APPENDIX F

- METHOD OF RANDOM SAMPLING -

To determine which students would be selected for the oral responses; the investigator had assistants draw slips of paper from a box that was approximately 8" x 12" x 5". On each slip of paper (3" x 2") was written a number corresponding to a pupil's code number. After each drawing, the piece of paper was placed back into the box. For the T.O. group, only 62 slips of paper were used; for the I.T.A. group 74 were used.

Sixty pupils (30 - I.T.A., 30 - T.O.) were selected by this method.

To determine which pupils were to be re-taped for a reliability check, the same random sampling technique was employed.

APPENDIX G

Sample Transcription with Boxed T-units

T. Can you tell us some funny things that might have happened to you?

P. Yes. [1 Once when me and my brother were playing, ~~playing~~ he got an idea of running to ~~the~~, the wall in the breezeway.] [2 And then I went through the storm door.] [3 And I got a big scar on my arm.] [4 And then in kindergarten they wondered where I was.] [5 And when I had the cast on it they said I had the cast on] and someone, [6 And my neighbor who lives across the street hit me with the ball when I was playing with it.] [7 And I could hardly eat.]

T. Did it hurt your arm any more after that?

P. Well, [8 it really hurt in here.] [9 I had to have a sling on this one and a cast on this one.]

T. How did you do that?

P. [10 It was on sort of a rainy day when I got this, the scar.] [11 We, me and Johnny, -- my brother, ~~well we~~ had these sort of blocks.] [12 And I had them all out.] [13 And John was going to be the audience or something like that.] [14 We were playing,] [15 he said that I was first doing it.] And I did it. And then after, [16 and then after I went through the door, mommy came running in and wondered what was the matter with me.] [17 And then there's stitches sticking up and white stuff and blood.

[18 And we went over to our neighbor's house.] [19 And we only had one car there.] [20 My father took it.] [21 And they had rags for me to put over it.] [22 And their father took me to the hospital.]

T. You went through the door in your house?

P. Yes. [23 That was a long time ago when I was either three or four.]

T. How did you fall through it?

P. Well, [24 I was running real hard.] [25 And I pushed down at the door and went through there.]

T. I'll bet you really gave your parents a scare.

P. [26 My father wasn't home.]

T. Were you afraid?

P. I thought, [27 I didn't know if it was going to break] or it wasn't. When, oh, ah, [28 I thought that I was running softly.] But I really wasn't.

T. Tell us about some funny things that might have happened.

P. Well, when I was once over at my neigh...my friend's house. [29 He does funny things.] [30 And I just giggle and giggle too much.] [31 And then I get the hiccups.]

T. Do you do anything to stop the hiccups?

P. Ya. [32 I take a drink of water.] And then I went in the kitchen or somewhere. And it's quiet. I'll take a drink of water and keep taking it until the hiccups stop.

APPENDIX H

WORKSHEET FOR A LINGUISTIC ANALYSIS

1. 1 Response
2. 0 Student Group
3-4. 40 Student Number
5. 1 Sex
6-7. 05 T-Unit Number
8-9. 11 Words in T-Unit
10-11. 02 Sentence Combining Transformations
12-13. 02 Base Nominals

T-UNIT:

I wish I had a volcano that was full of milk.

Headed: Modified by

14. ___Noun
15. ___Adjective
16. ___Genitive Form
17. / Relative Clause
18. ___Prepositional Phrase
19. ___Infinitive Phrase
20. ___Participial Phrase
21. ___Adverbial
22. ___Other

Non-Headed

23. / Noun Clause
24. ___Prepositional Phrase
25. ___Infinitive Phrase
26. ___Infinitive with Subject
27. ___Gerund Phrase
28. ___Non-restrictive Appositive
29-30. ___Adverbial Structures
31. ___Adverb Clause (Movable)
32. ___"Other" Adverb Clause
33. ___Adverbial Infinitive
34. ___Other
35-36. ___Coordinate Structures
37. ___Modifiers
38. ___Nominals
39. ___Predicates
40-41. 02 Total Subordinate Clauses
42-43. 03 Total Clauses

APPENDIX I

"OTHER TYPES" OF ADVERBIAL STRUCTURES
(Raw Scores)

	I.T.A.		T.O.	
	W.	O.	W.	O.
1. "By" Phrases	0	2	2	0
2. "For" Phrases	9	1	3	3
3. "Ly" Adverbs	9	1	1	3
4. Clause Adjuncts	4	0	3	0
5. "Because of" Phrases	3	0	0	4
6. "With" Phrases				
Instrumental	4	0	2	1
Concomitant	16	17	7	17

See pages 33 - 34 in Chapter 2

APPENDIX J

Raw Frequency Scores of Verbs Preceding Noun Clauses Written and Oral Responses

Written			Oral	
I.T.A. (N=74)	T.O. (N=62)	VERB	I.T.A. (N=30)	T.O. (N=30)
24	146	wish	0	0
24	20	know	15	18
38	12	think	20	32
26	21	is	10	12
11	5	see	1	2
1	2	ask	2	1
0	2	like	0	0
1	1	bet	0	0
2	1	find	1	0
4	1	tell	3	1
1	1	mean	0	0
3	0	decide	0	0
8	0	hope	0	2
3	0	say	3	6
1	0	talk about	0	0
1	0	pretend	0	1
2	0	wonder	0	0
1	0	swear	0	0
2	0	guess	0	0
1	0	imagine	0	0
1	0	made	0	0
1	0	watch	0	0
1	0	eat	0	0
1	0	write	0	0
0	0	forget	5	1
0	0	plan	0	1
0	0	notice	0	1
0	0	show	0	1
0	0	believe	3	0
0	0	remember	1	0
0	0	doubt	1	0
0	0	expect	1	0
0	0	hear	2	0

APPENDIX K

Frequency Scores for Verbs Preceding Subject+Infinitive Constructions in Written Responses

I.T.A. (N=74)	Verb	T.O. (N=62)
8	let	25
8	make	3
5	want	0
0	like for	1
0	have	3
--	--------	--
8	help	7
2	heard	1
4	saw	4
2	watch	2

APPENDIX L

Raw Frequency Scores for Single Base and Sentence Combining Failures in Written Responses

		I.T.A. (74)	T.O. (62)
Single Base Failures:			
	Omissions	61	46
	Deletions	24	22
	Total	85	68
*Sentence Combining Failures:			
	Garbles	11	43
	Omissions	20	38
	Deletions	29	59
	Subject or Verb Missing:	33	45
	Other T-Failures	67	37
	Conjoining	20	55
	Total:	180	278

*All of the "Sentence Combining Failures" were reported as "garbles" and were computed to determine the "Garble Index."